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Chen et al.

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(45) **Date of Patent: Jun. 14, 2011**

(54) **OSCILLATING DEVICE FOR CHILDREN'S SWING APPARATUS**

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(73) Assignee: **Excellerate Enterprise Co., Ltd.**, Taipei (TW)

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(22) Filed: **Jun. 17, 2008**

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(30) **Foreign Application Priority Data**

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Mar. 21, 2008 (CN) 2008 1 0086287

(51) **Int. Cl.**
A63G 9/16 (2006.01)
A63G 9/00 (2006.01)

(52) **U.S. Cl.** **472/119**

(58) **Field of Classification Search** 472/118–125; 297/273, 274, 281

See application file for complete search history.

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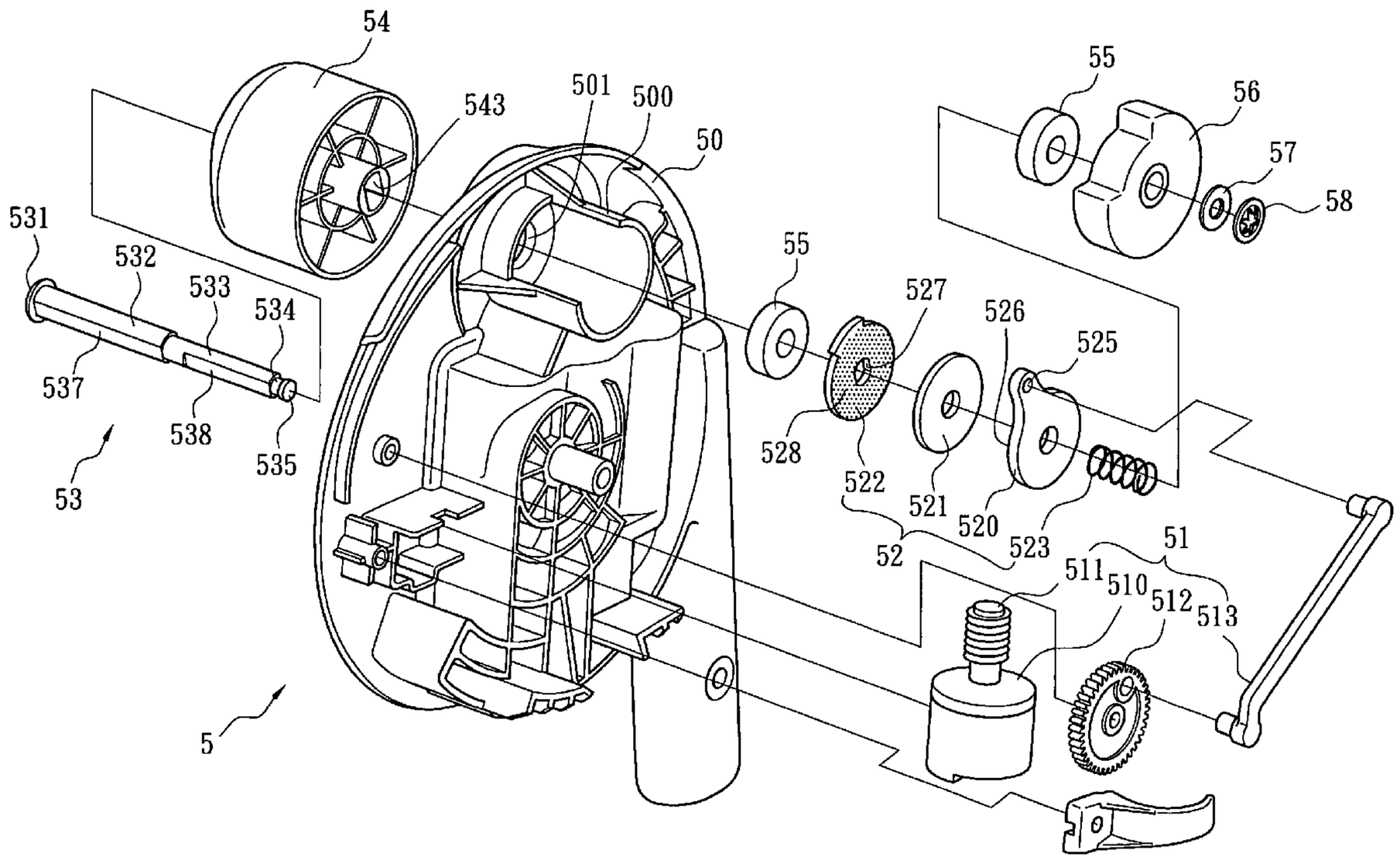
(74) *Attorney, Agent, or Firm* — Bacon & Thomas, PLLC

(57) **ABSTRACT**

An oscillating device for a children's swing apparatus includes a base, a driving assembly mounted to the base, a first friction piece connected to the driving assembly, and a second friction piece operably driven by the first friction piece depending on a friction force therebetween. An elastic piece urges against one of the first friction piece and the second friction piece, a first shaft passes through a transmitting assembly, and an output member is operated by one of the first shaft and the second friction piece. The swing apparatus further includes a first frame supported on the ground, a second frame in which the sitting device is mounted such that the oscillating device connects the first frame to the second frame.

18 Claims, 22 Drawing Sheets



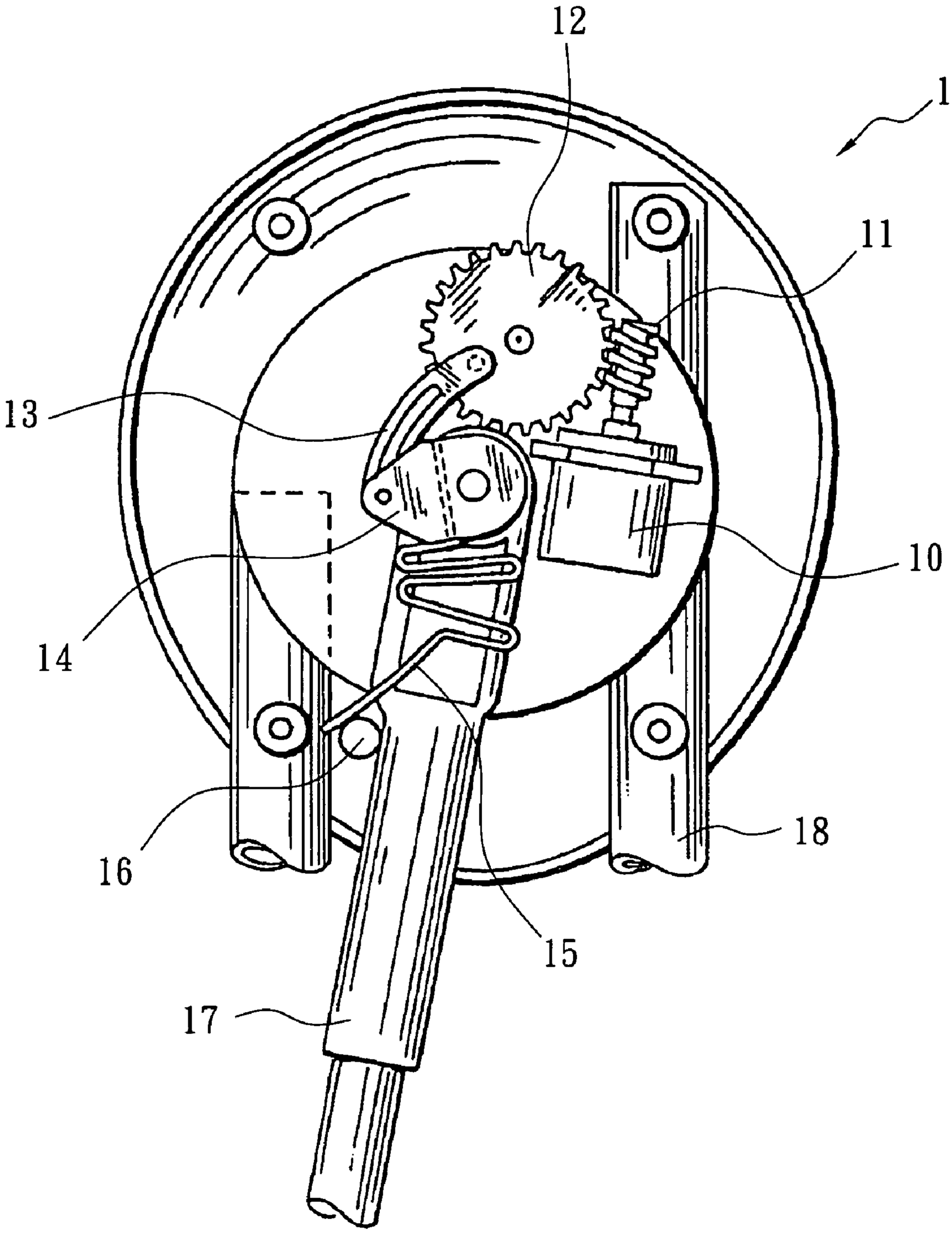


FIG. 1
Prior Art

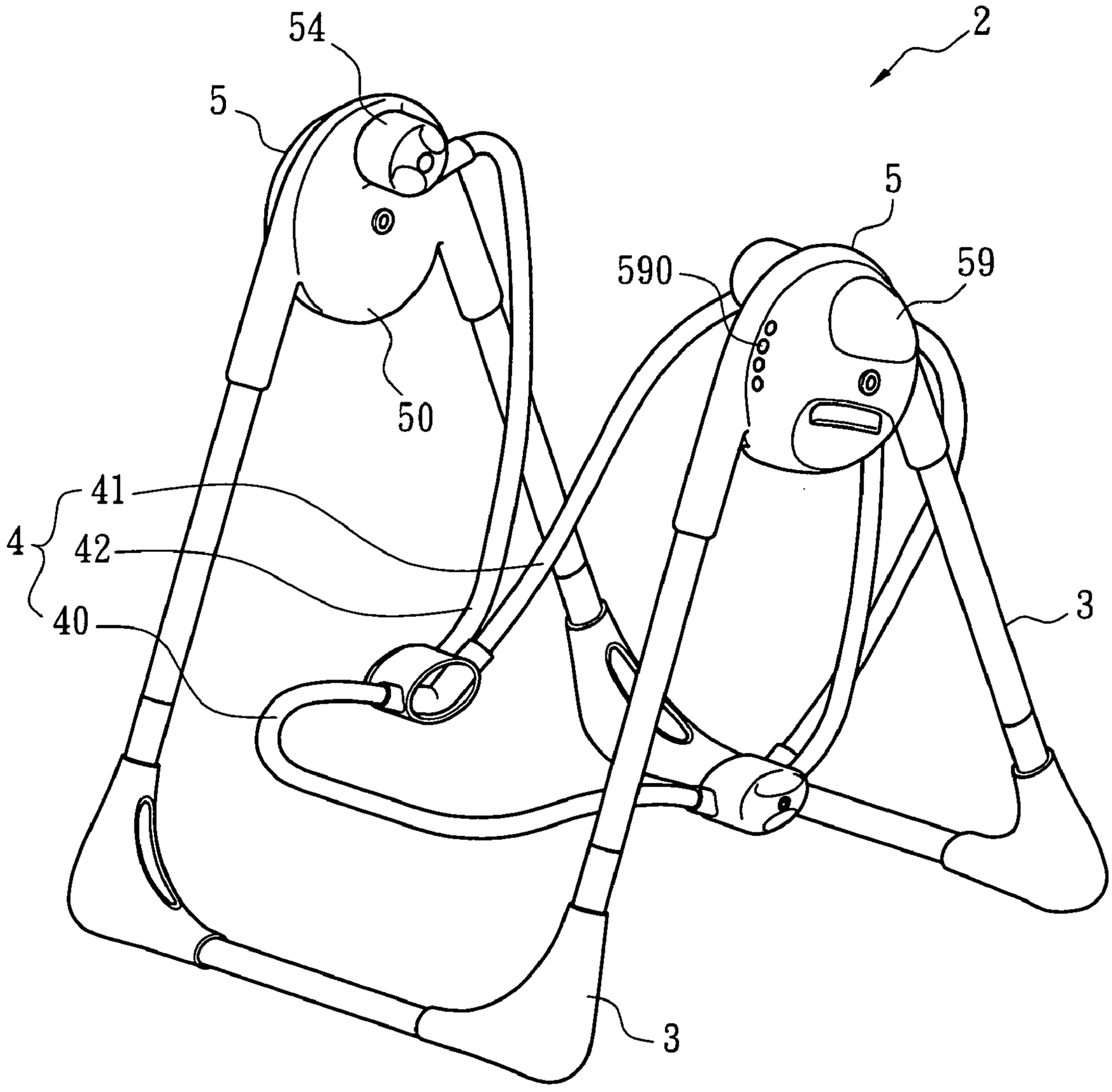


FIG. 2

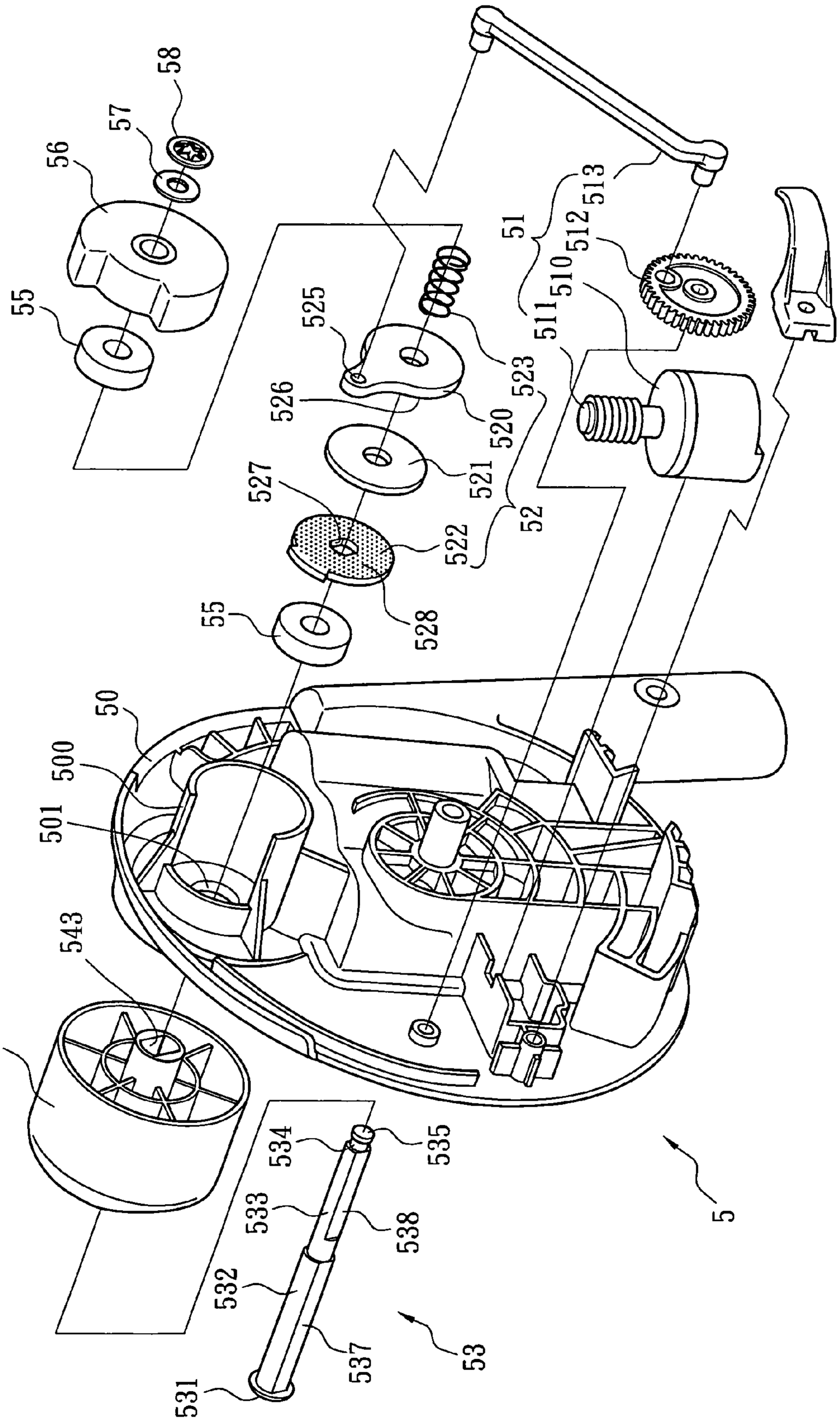

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FIG. 3

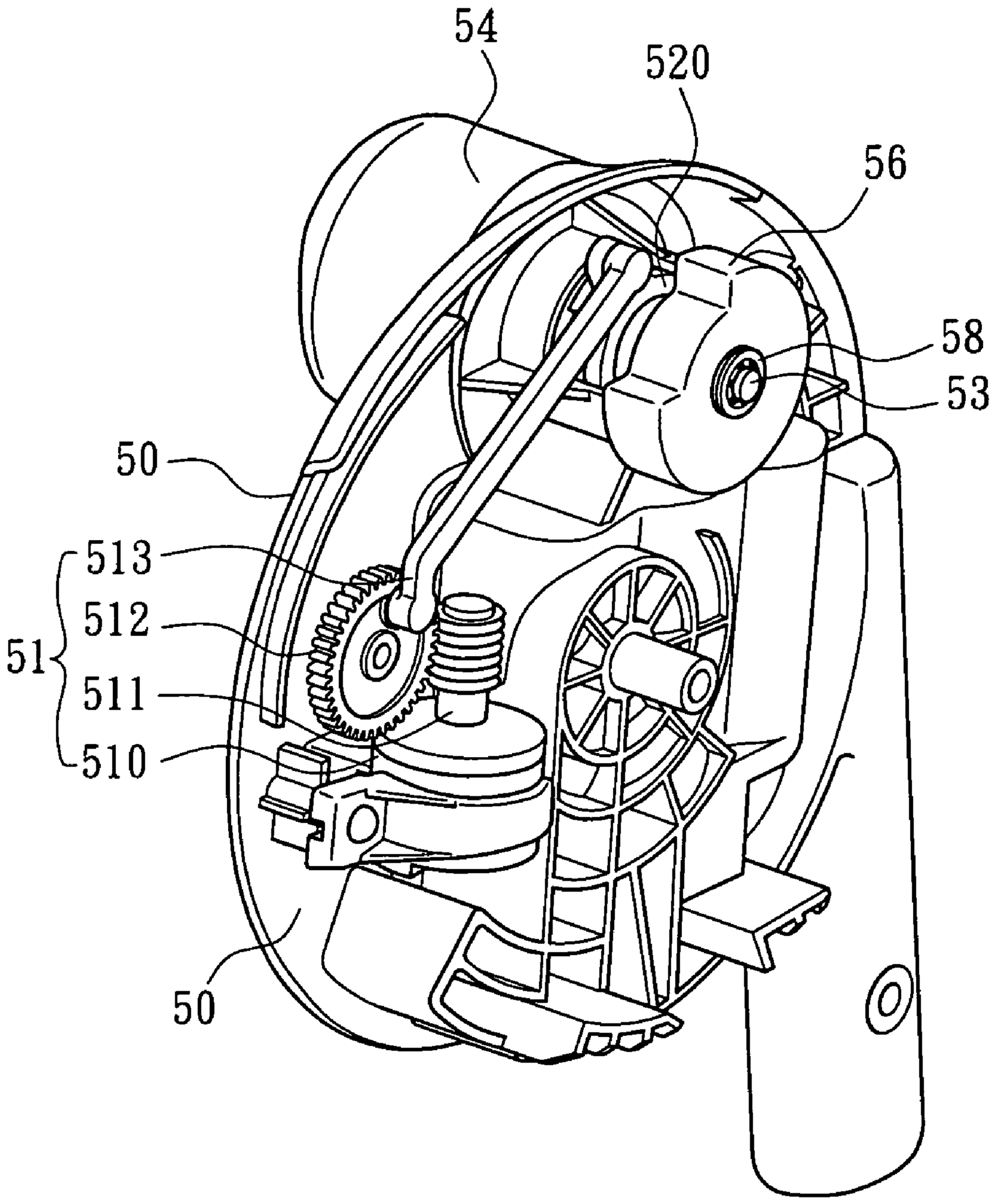


FIG. 4

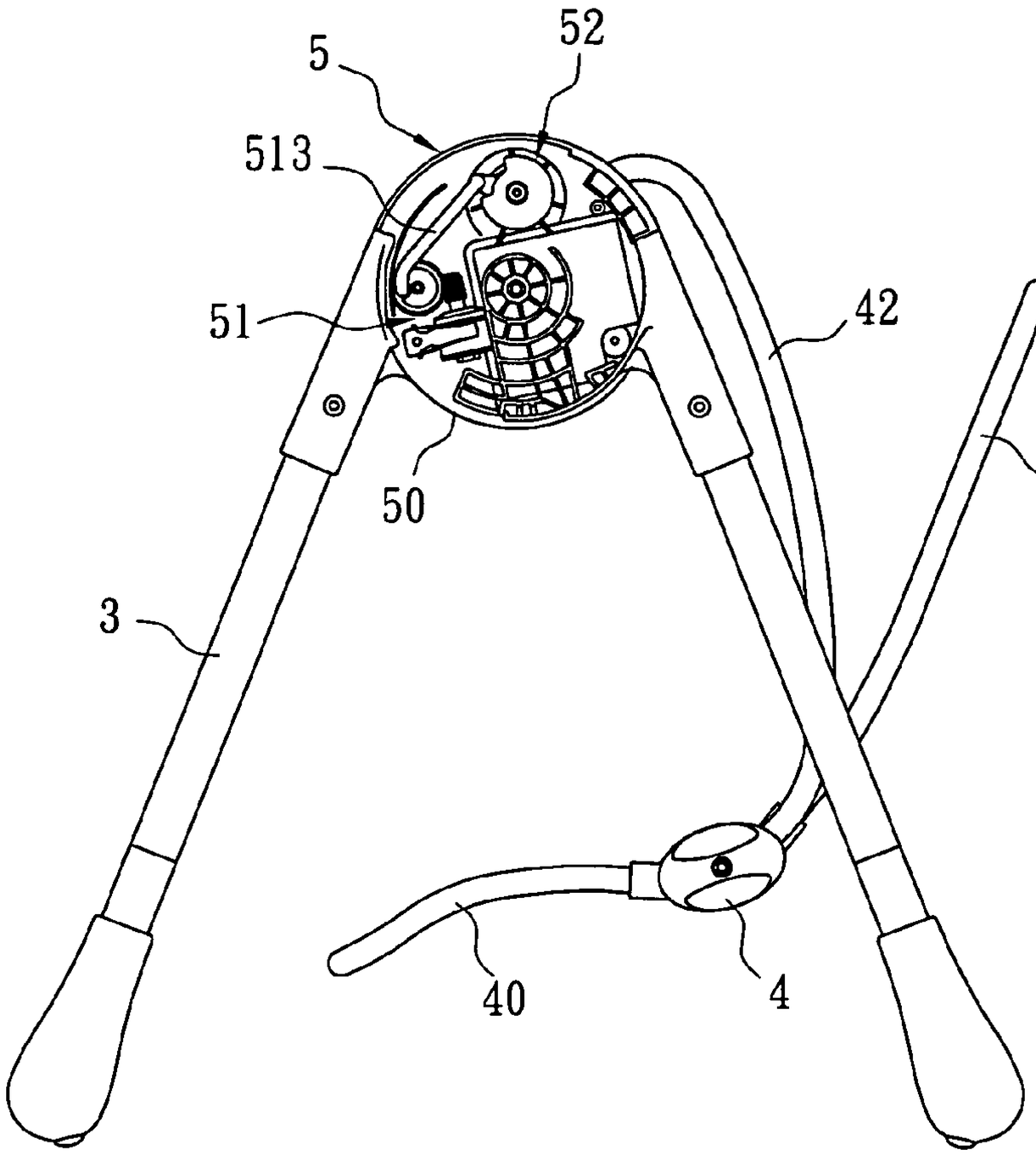


FIG. 5

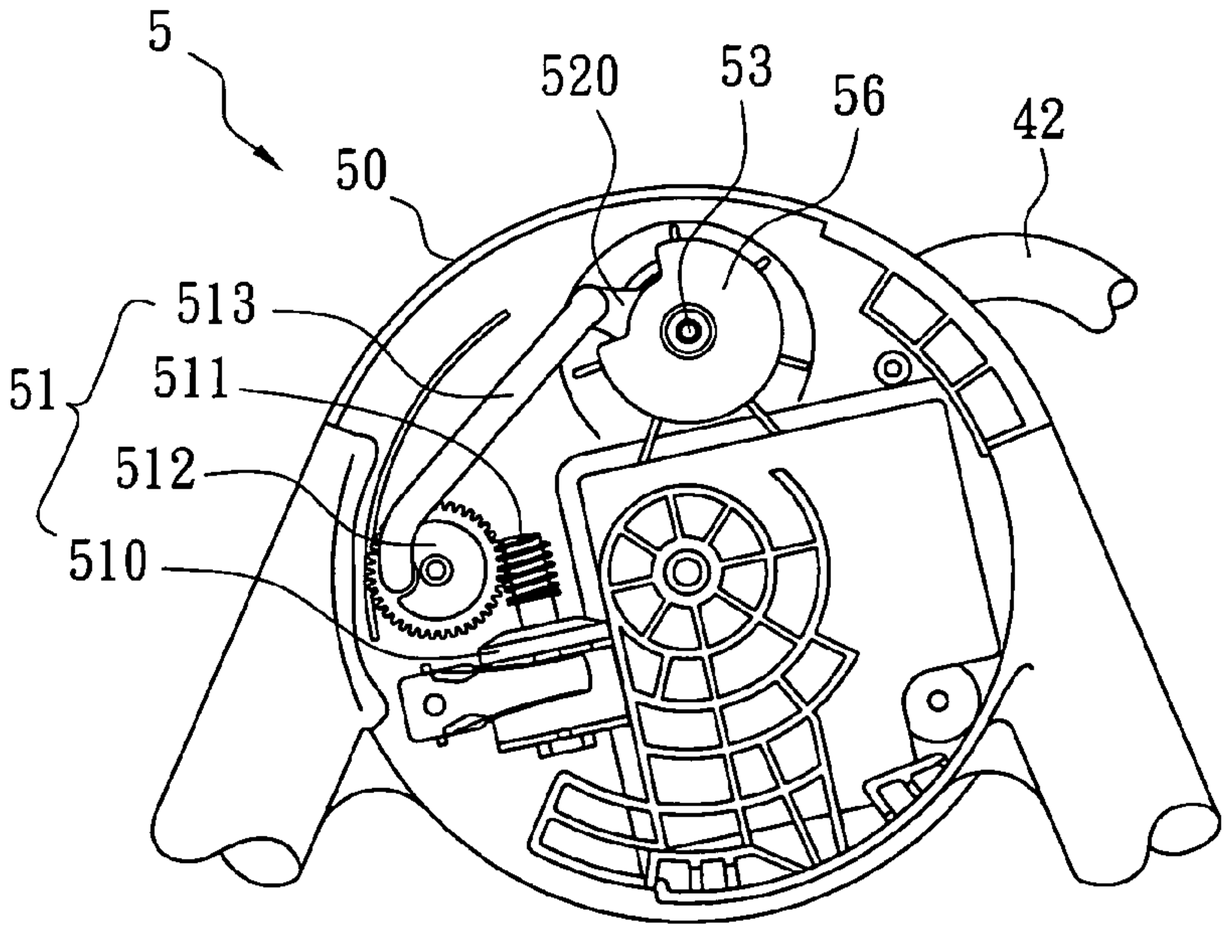
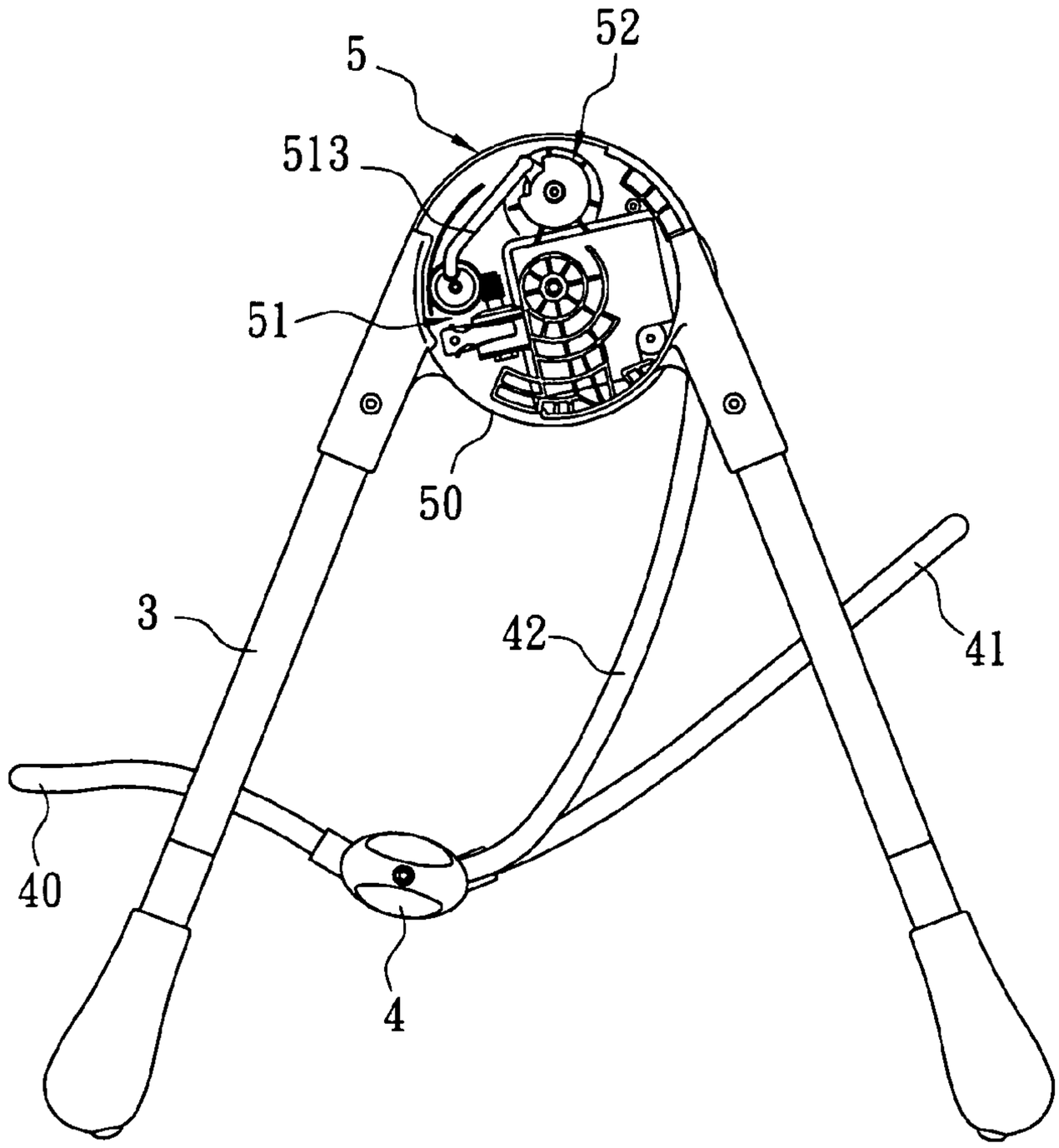


FIG. 6



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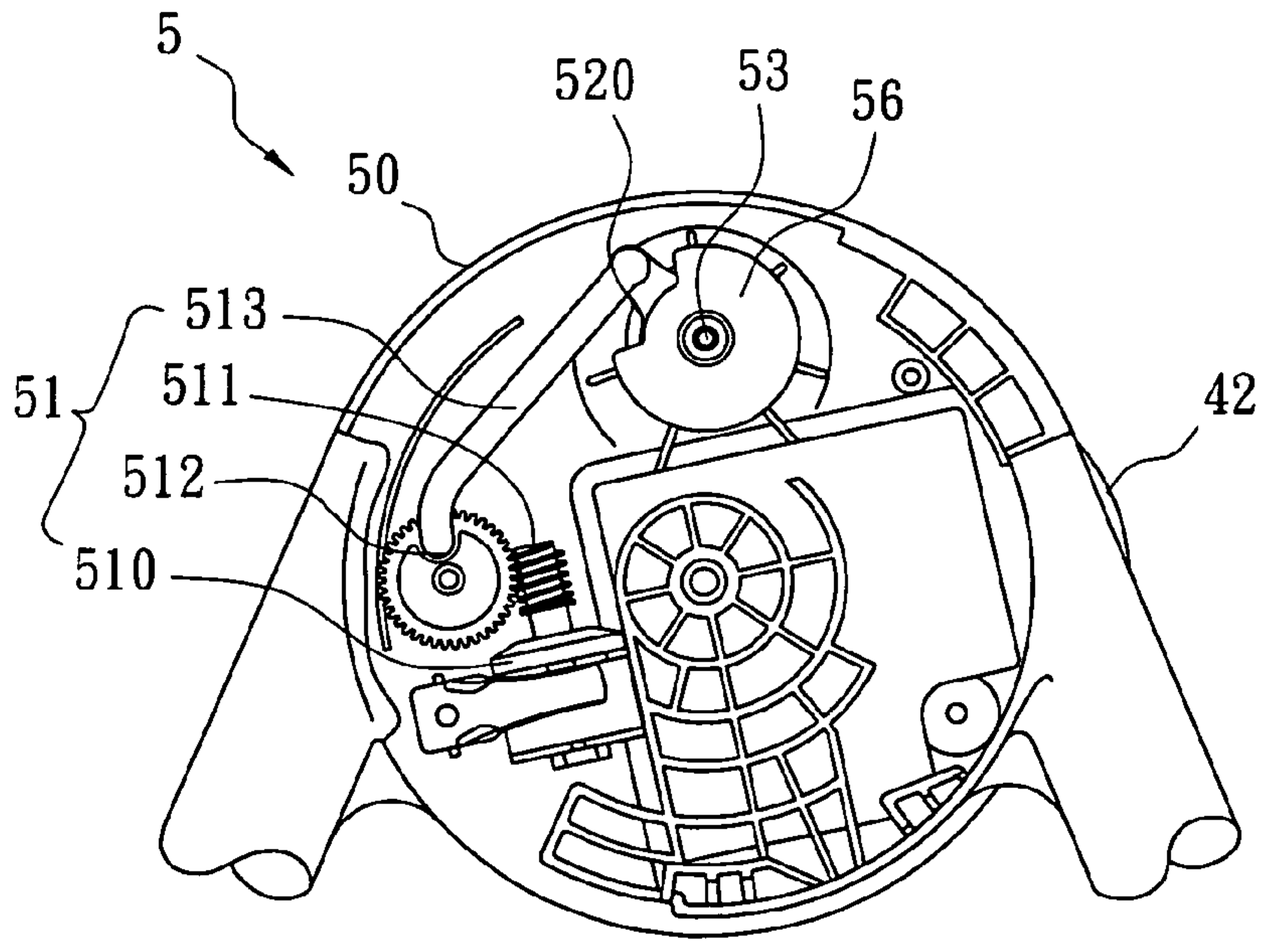

FIG. 8

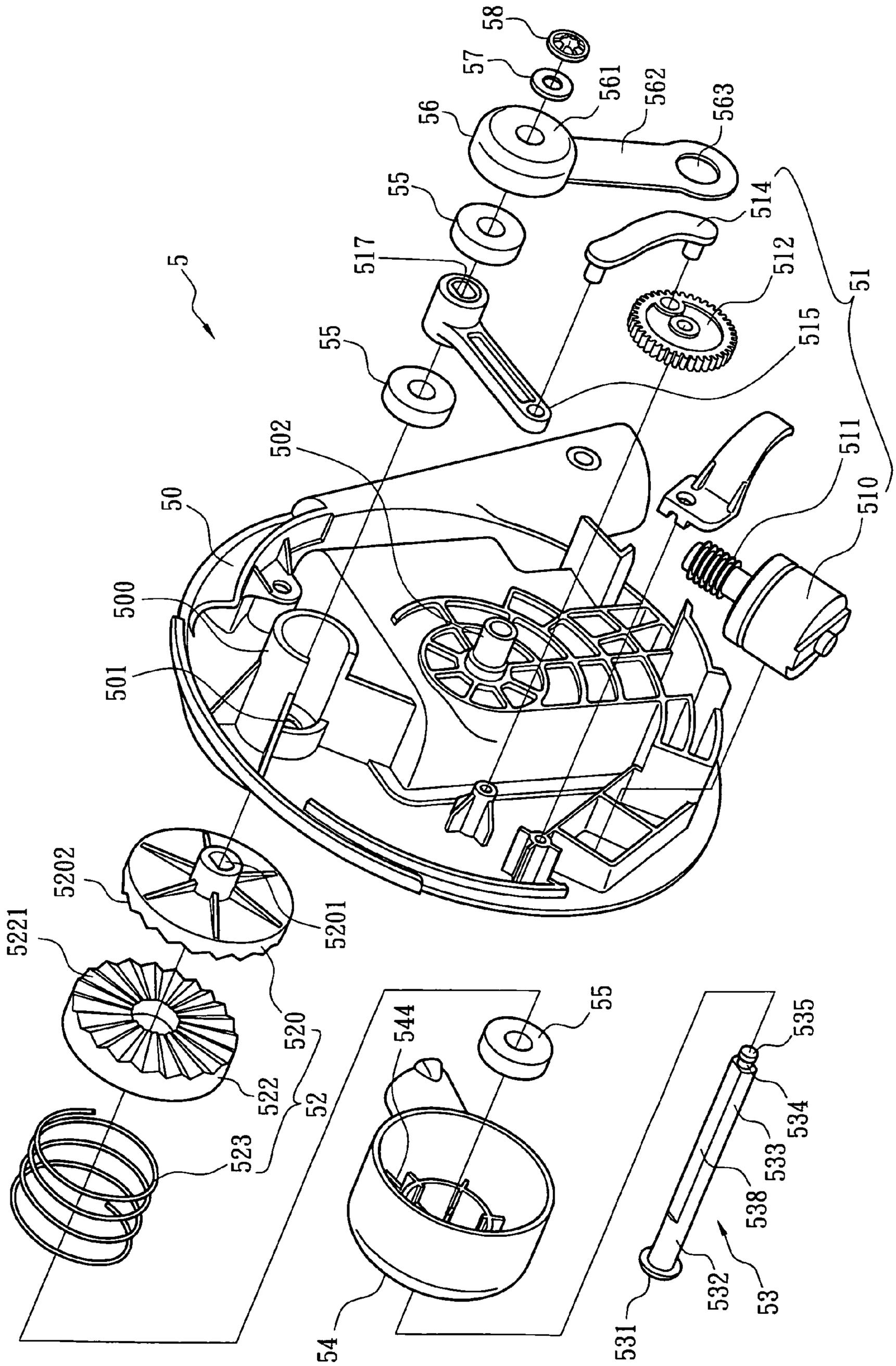
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FIG. 9

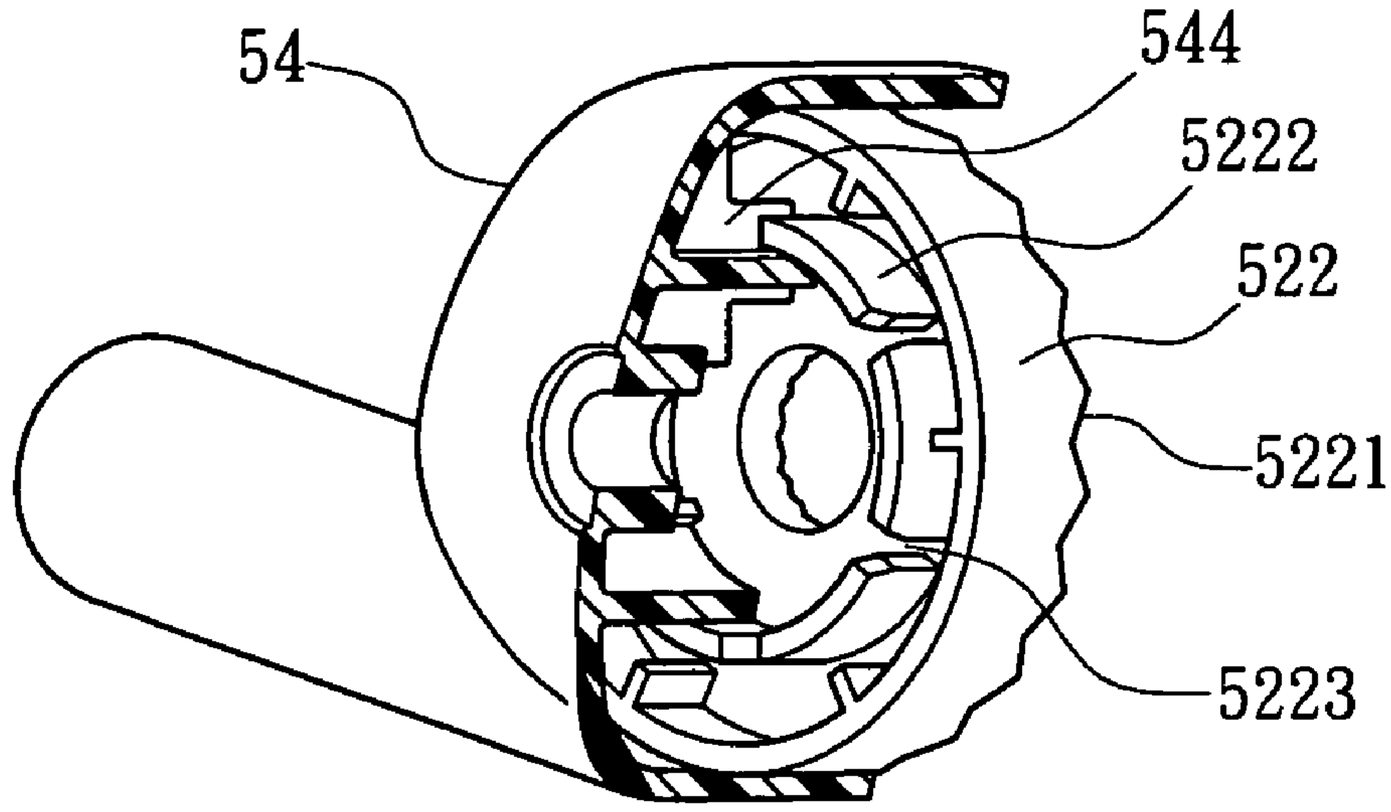
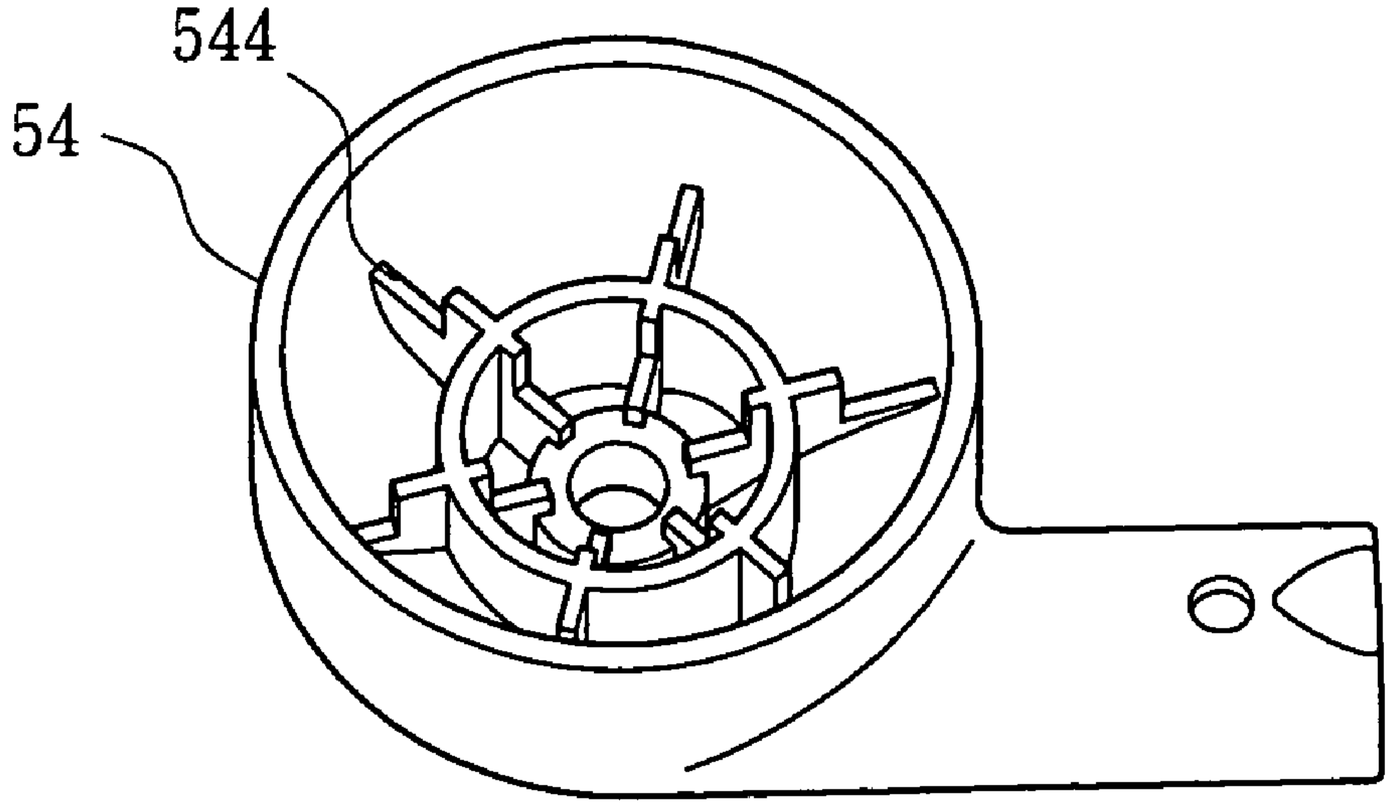


FIG. 10



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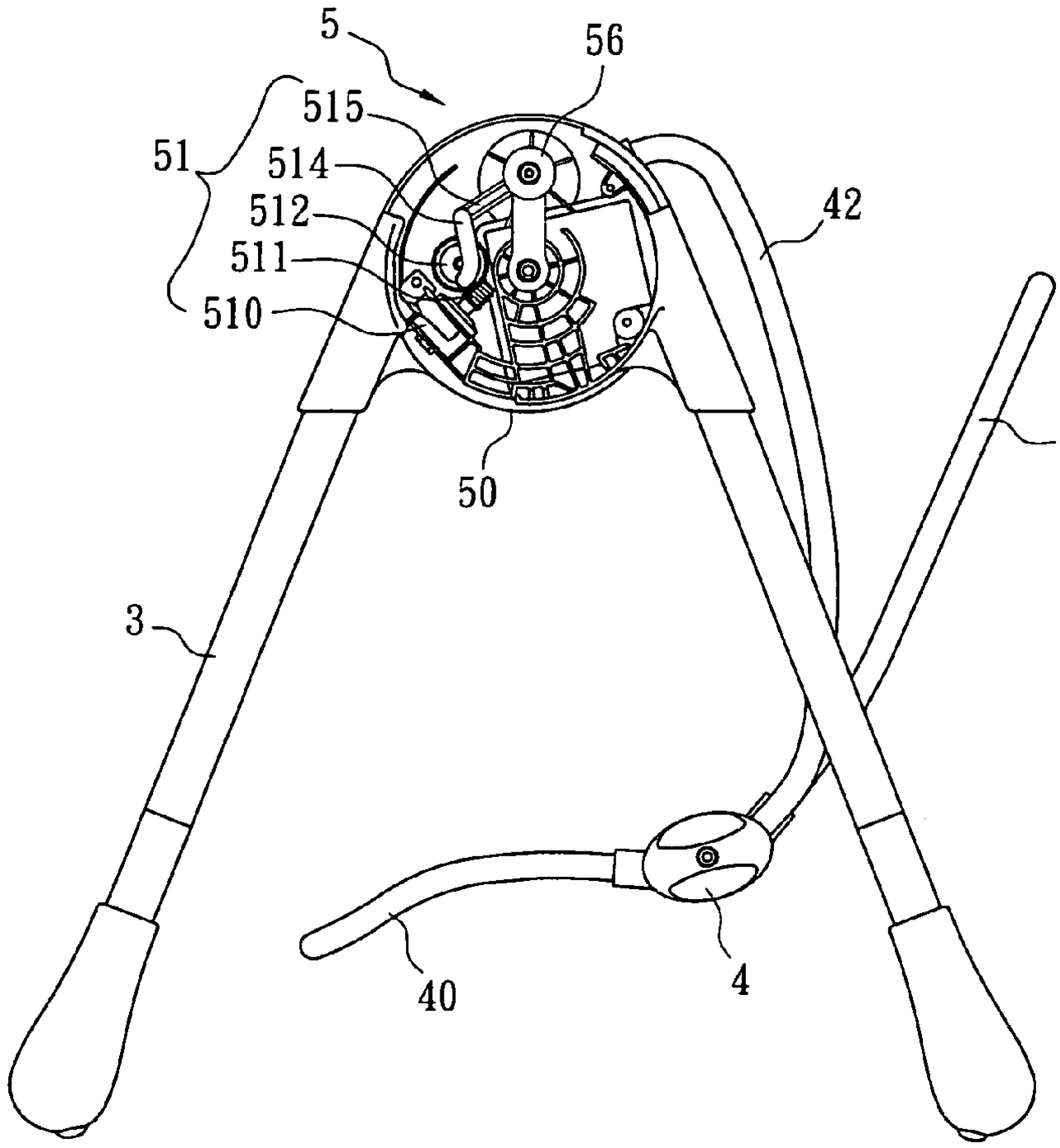
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FIG. 12

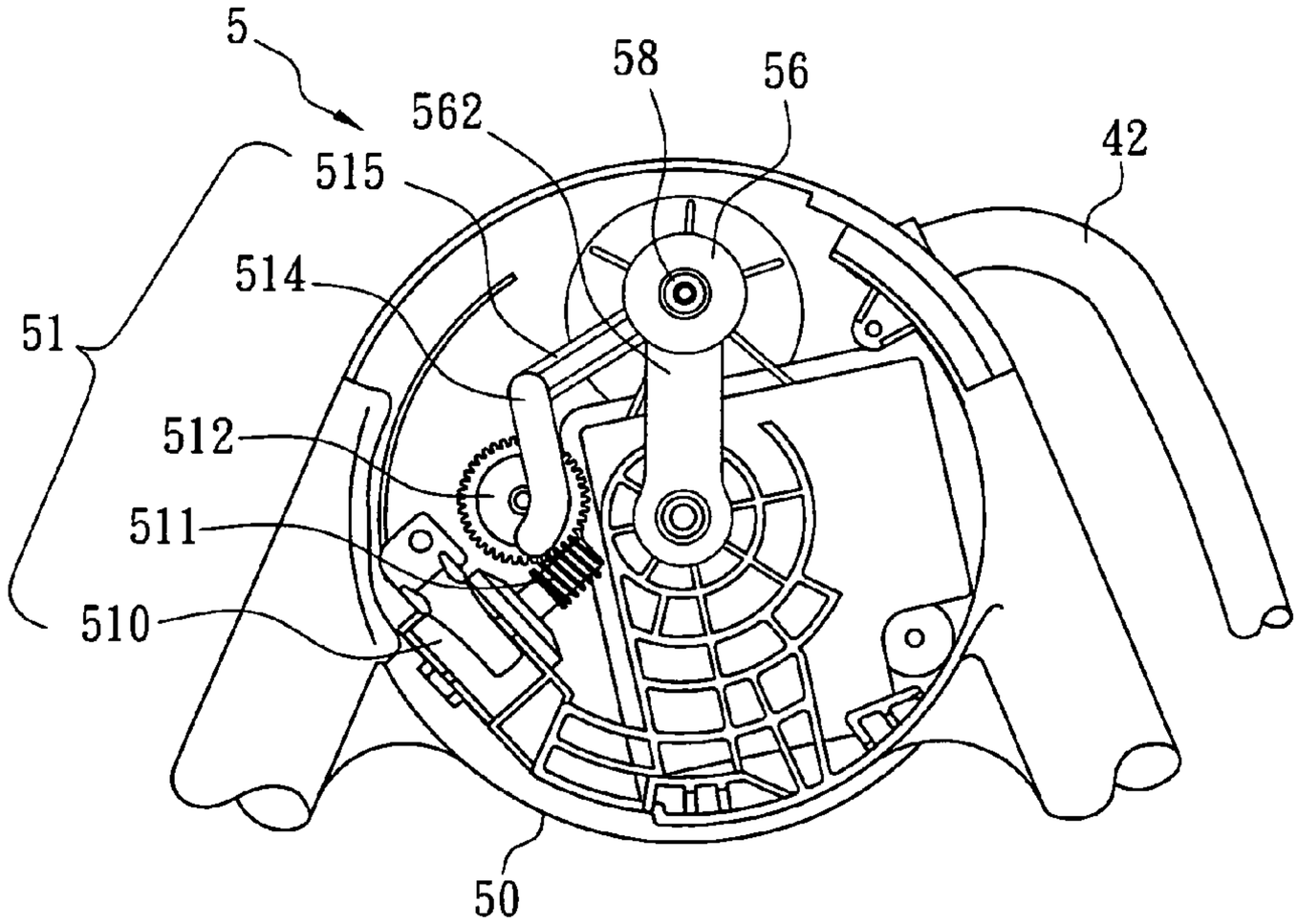
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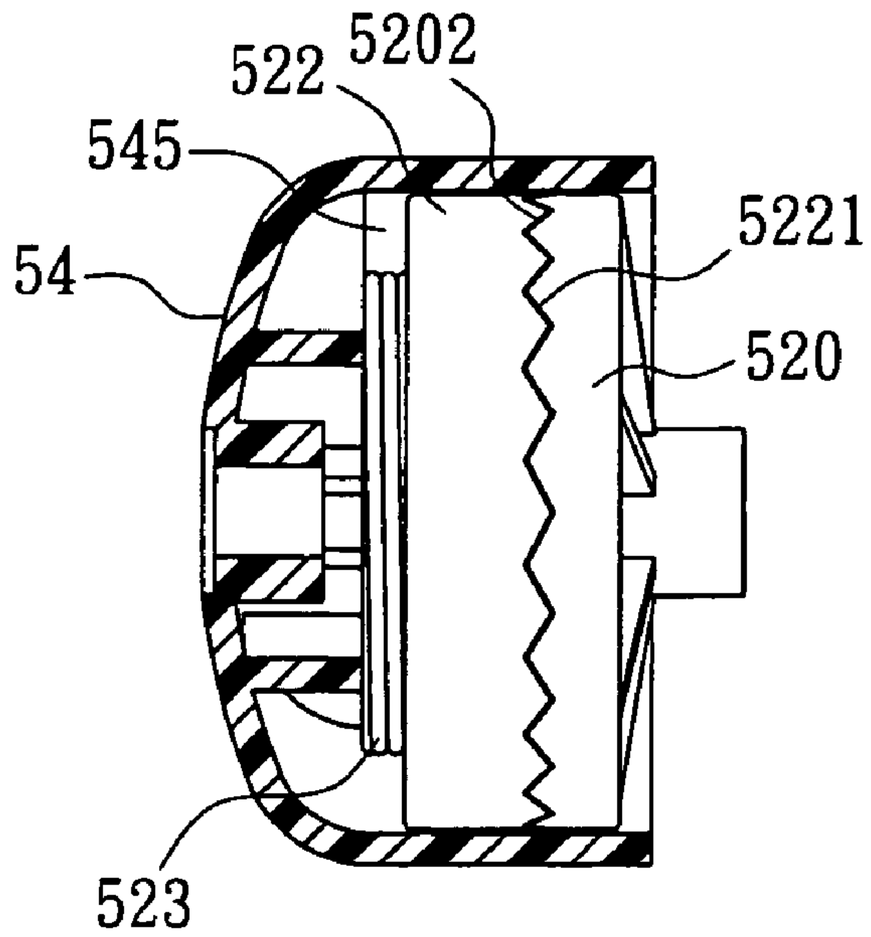
FIG. 13



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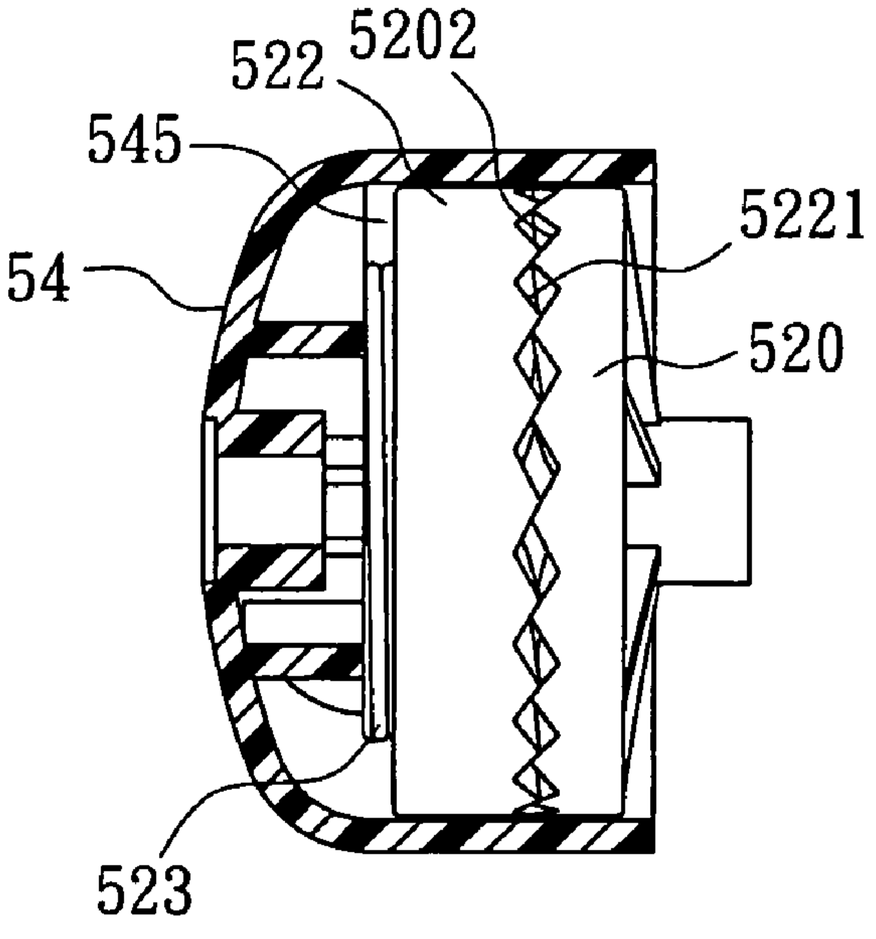

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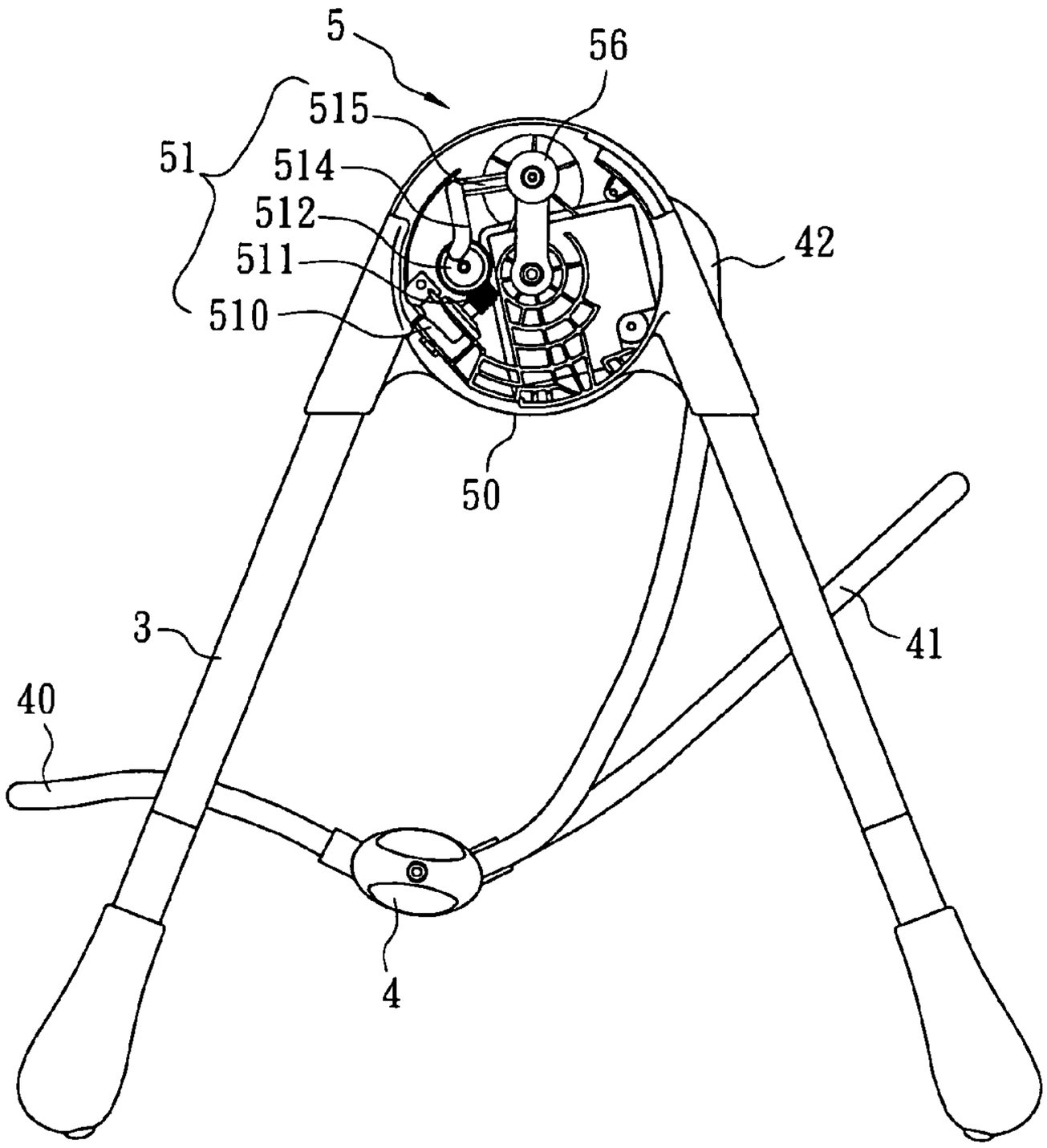
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FIG. 16

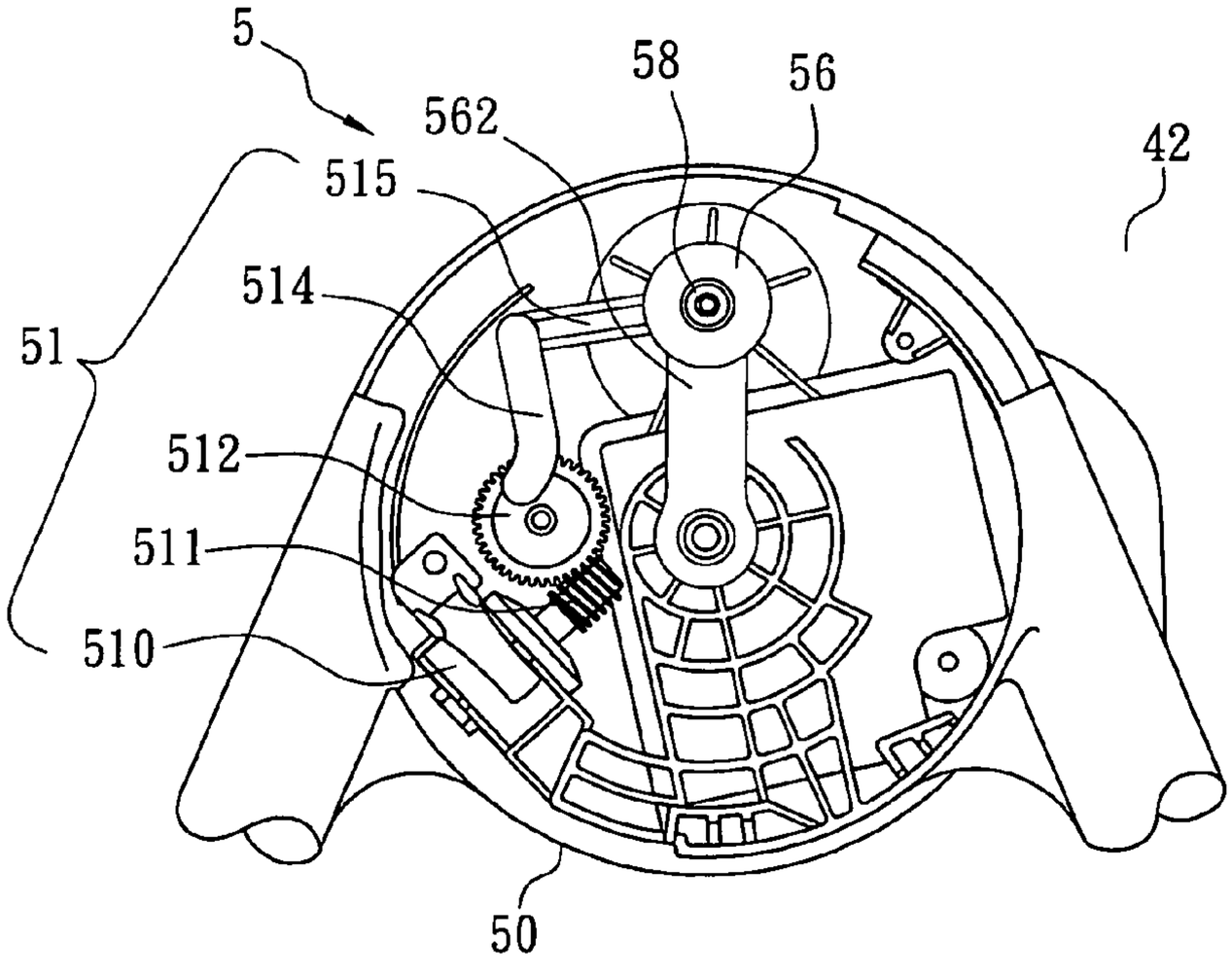
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FIG. 17

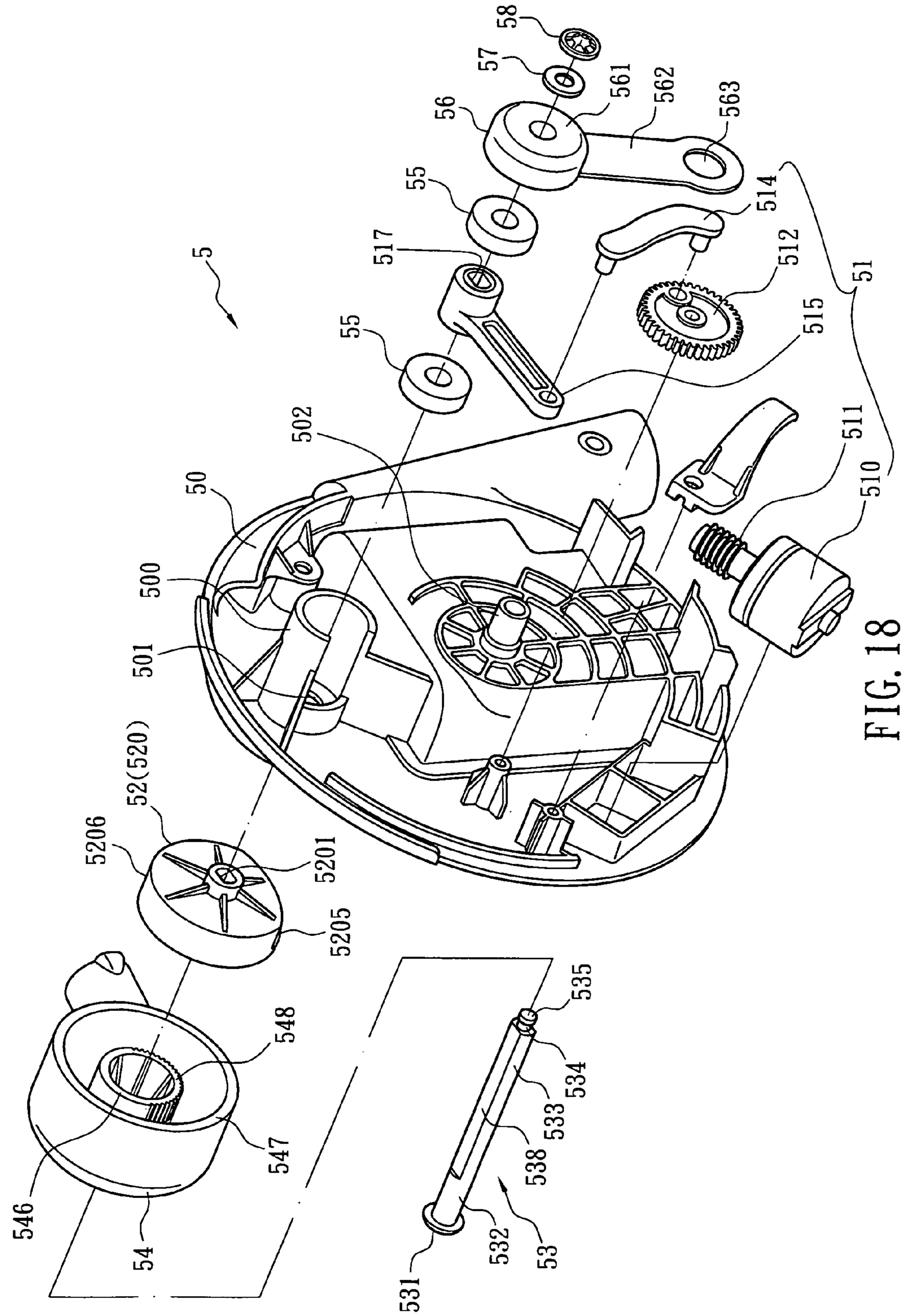
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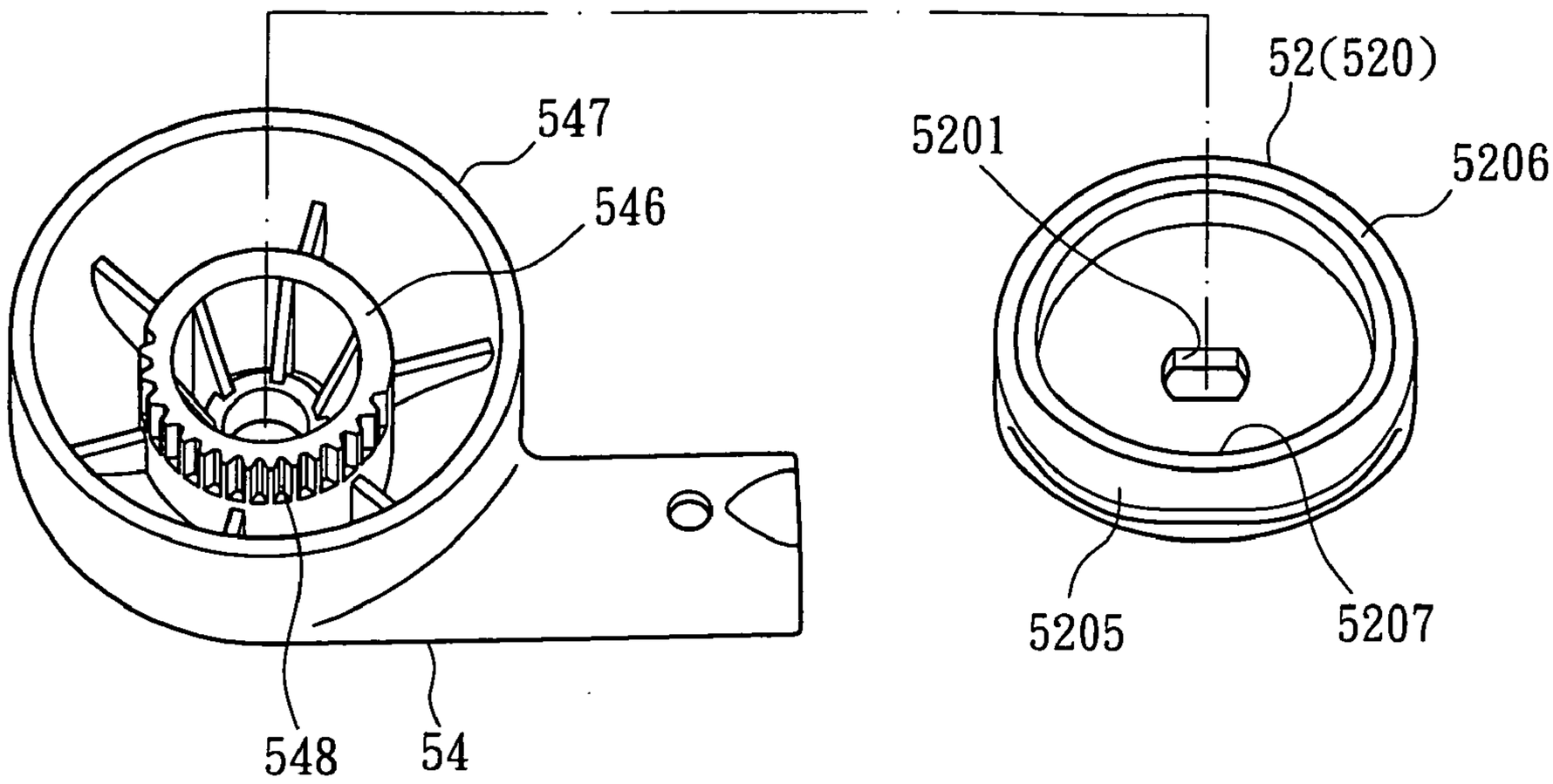
FIG. 18



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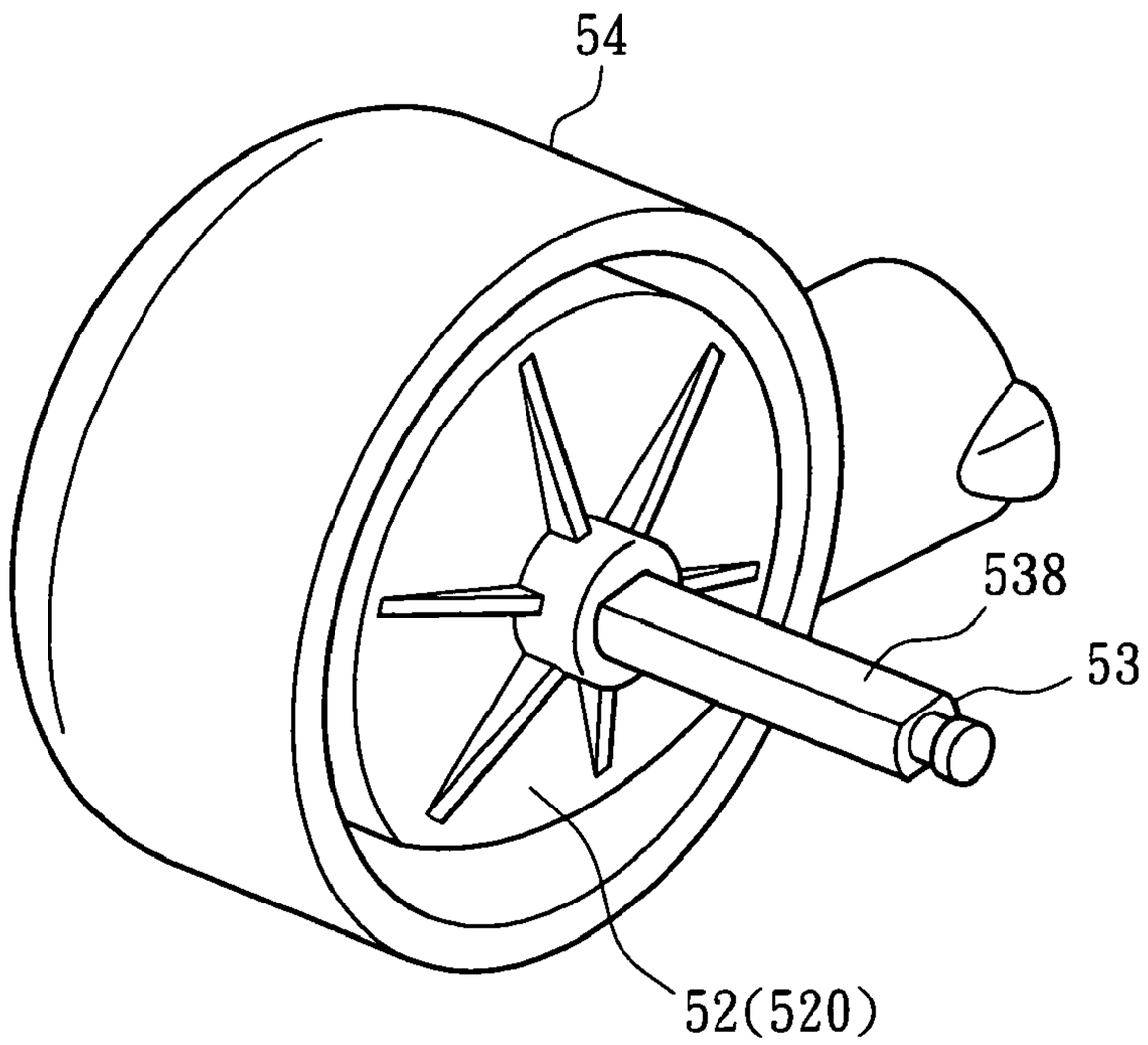

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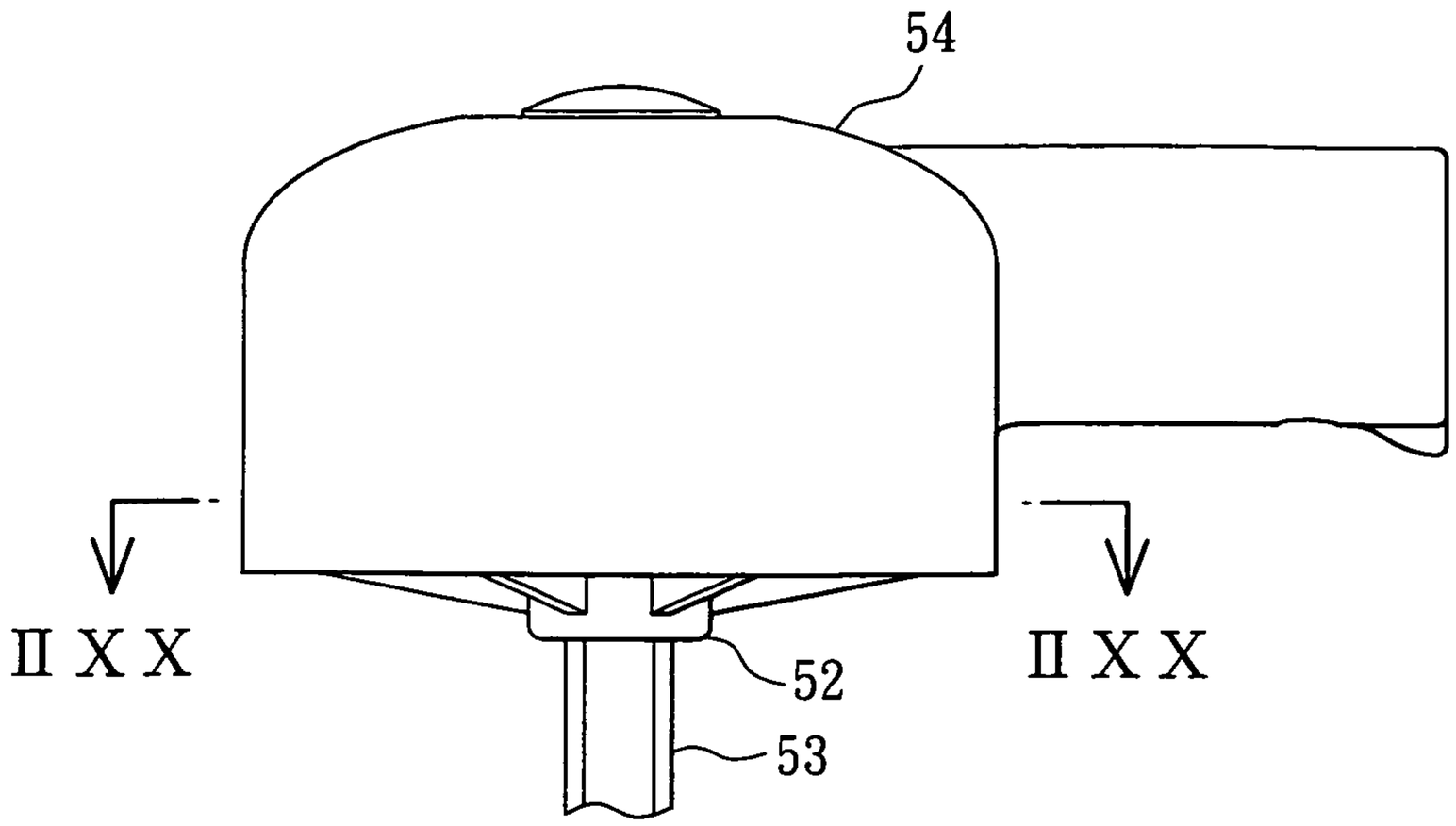

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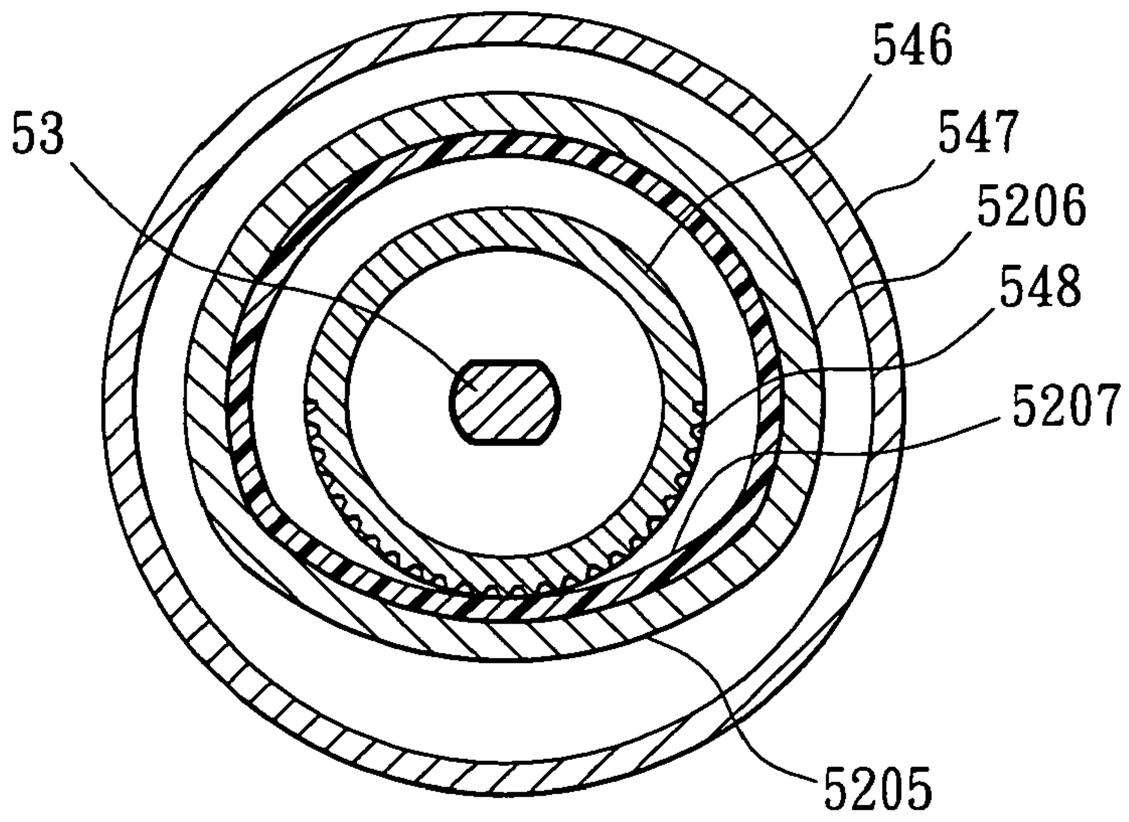

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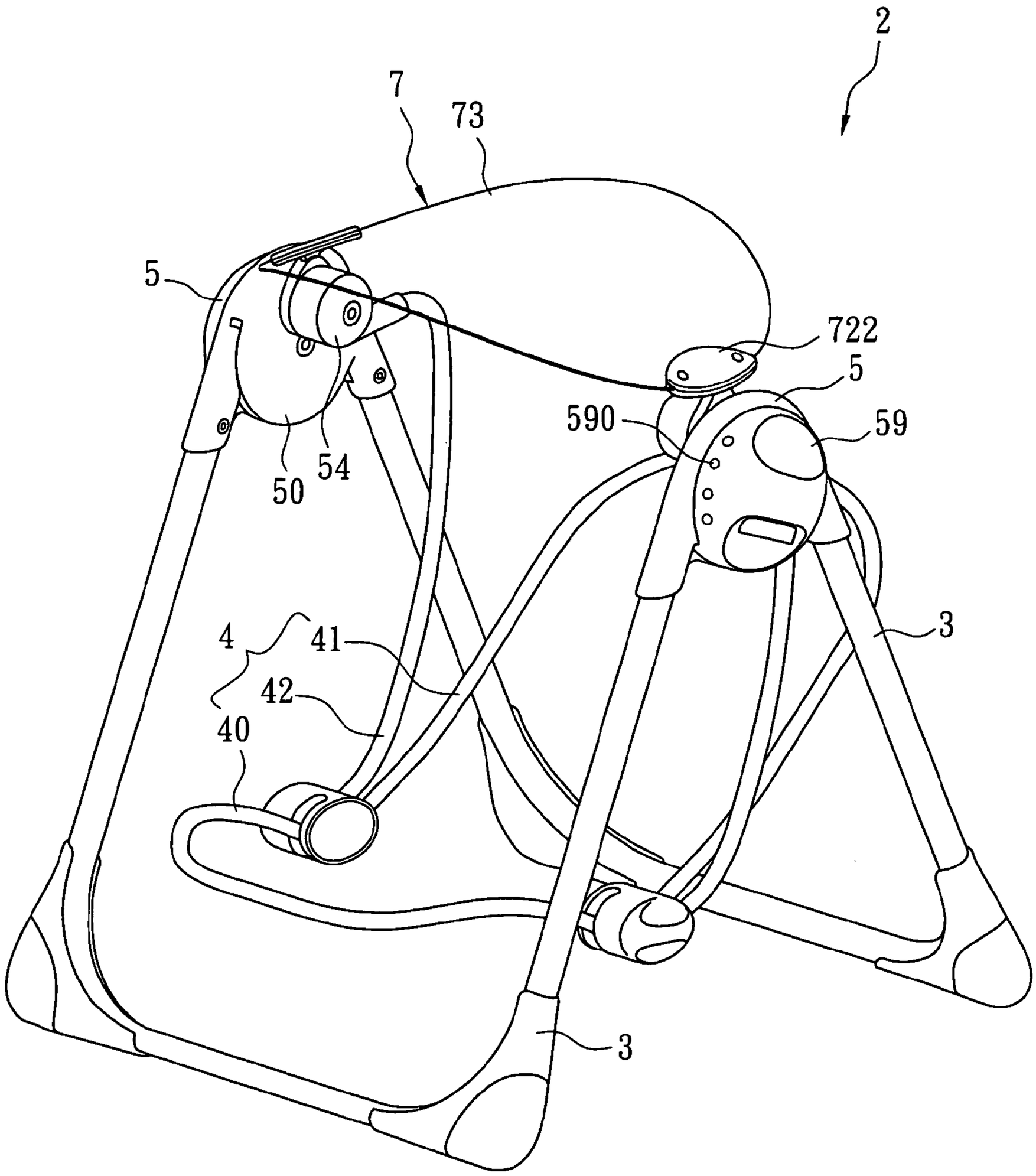

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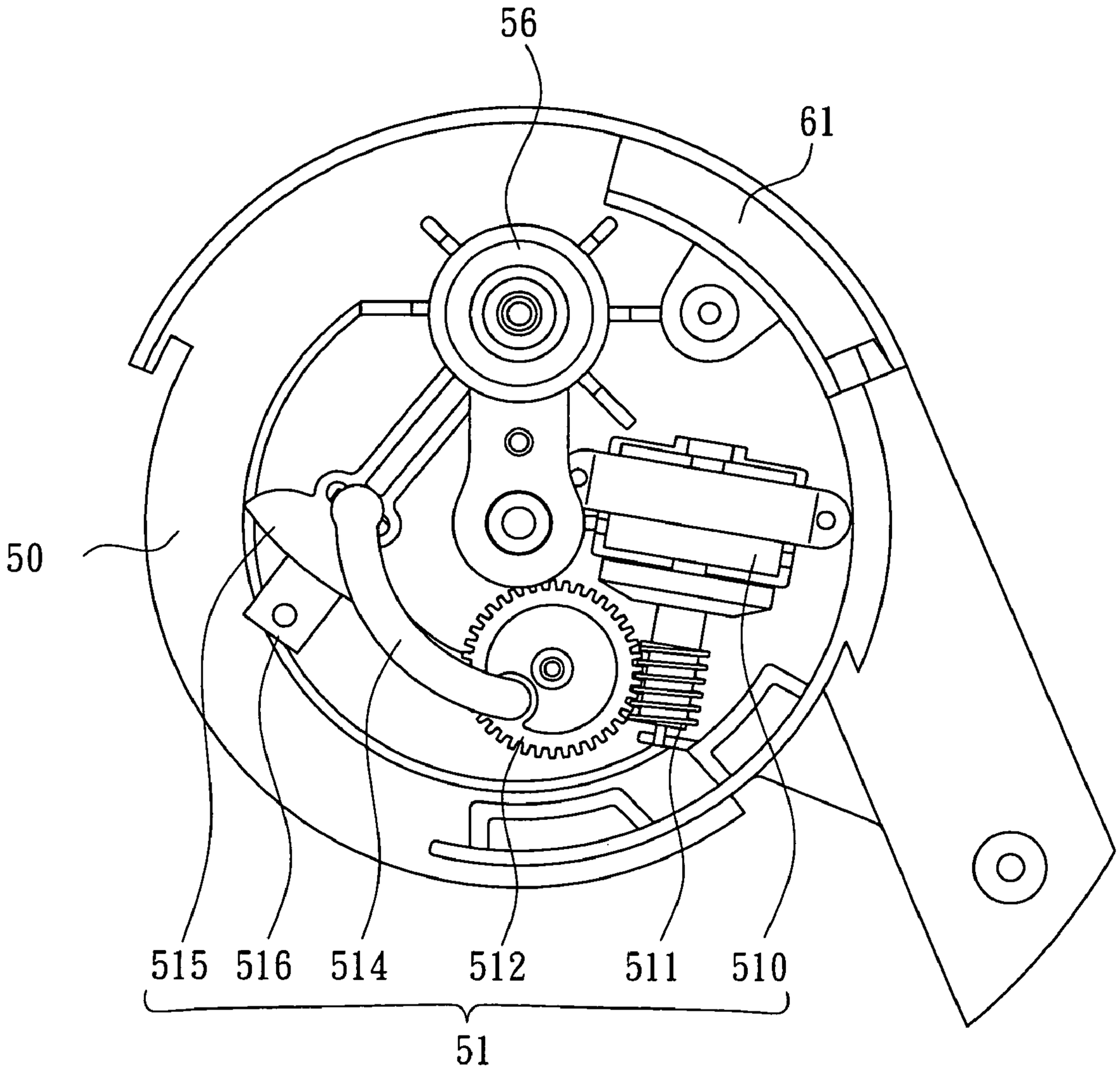

FIG. 24

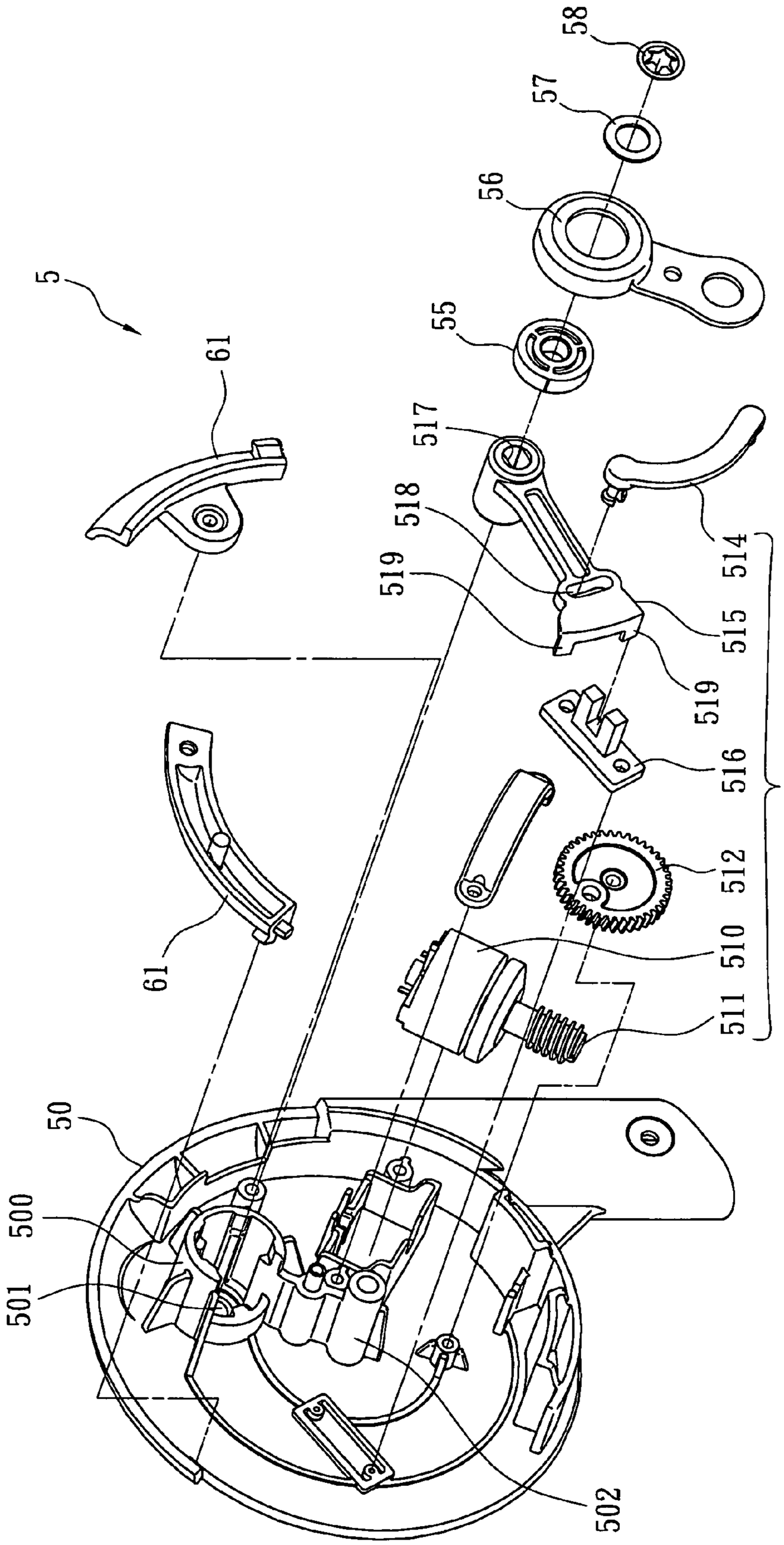
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FIG. 25

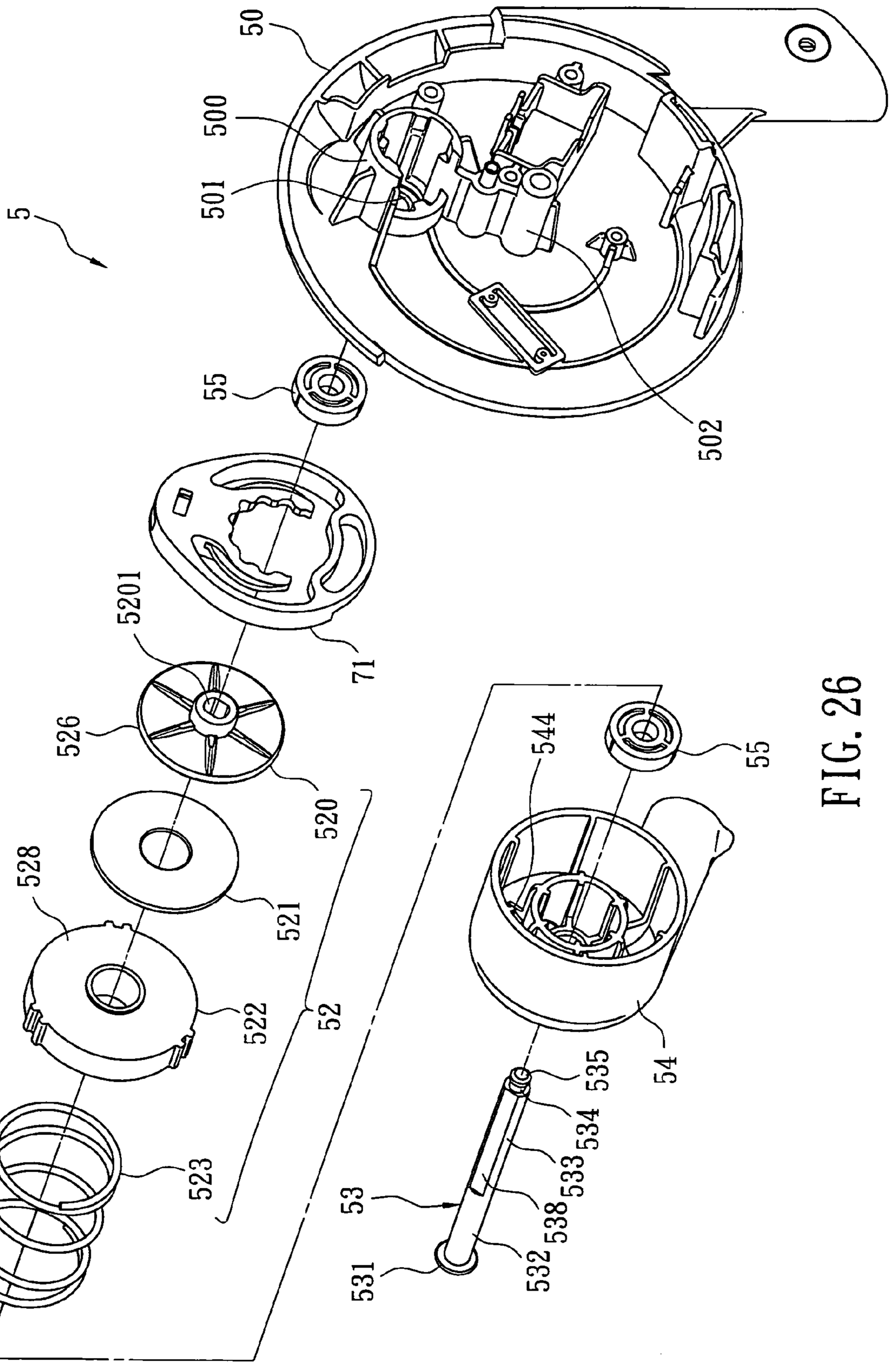
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FIG. 26

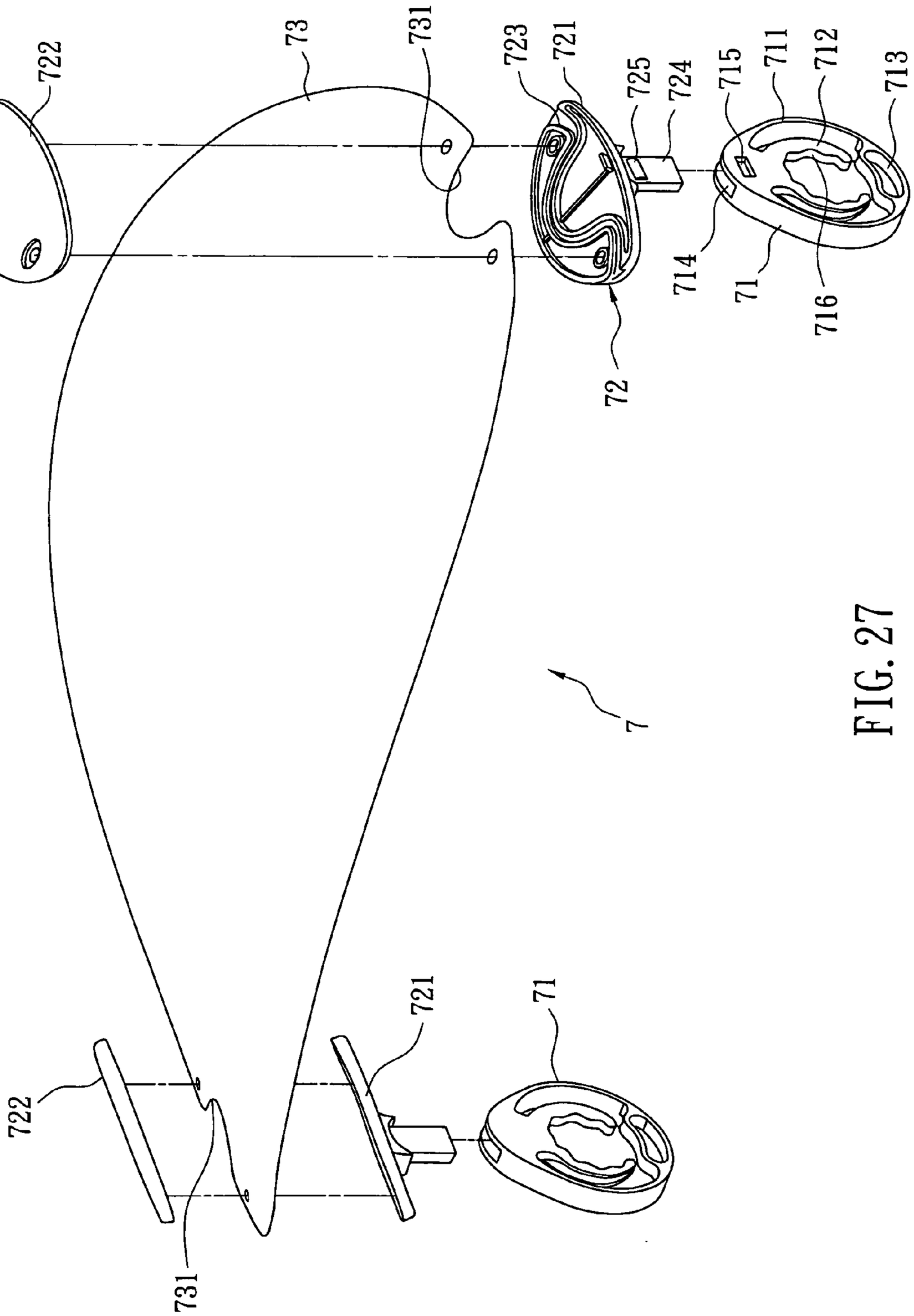
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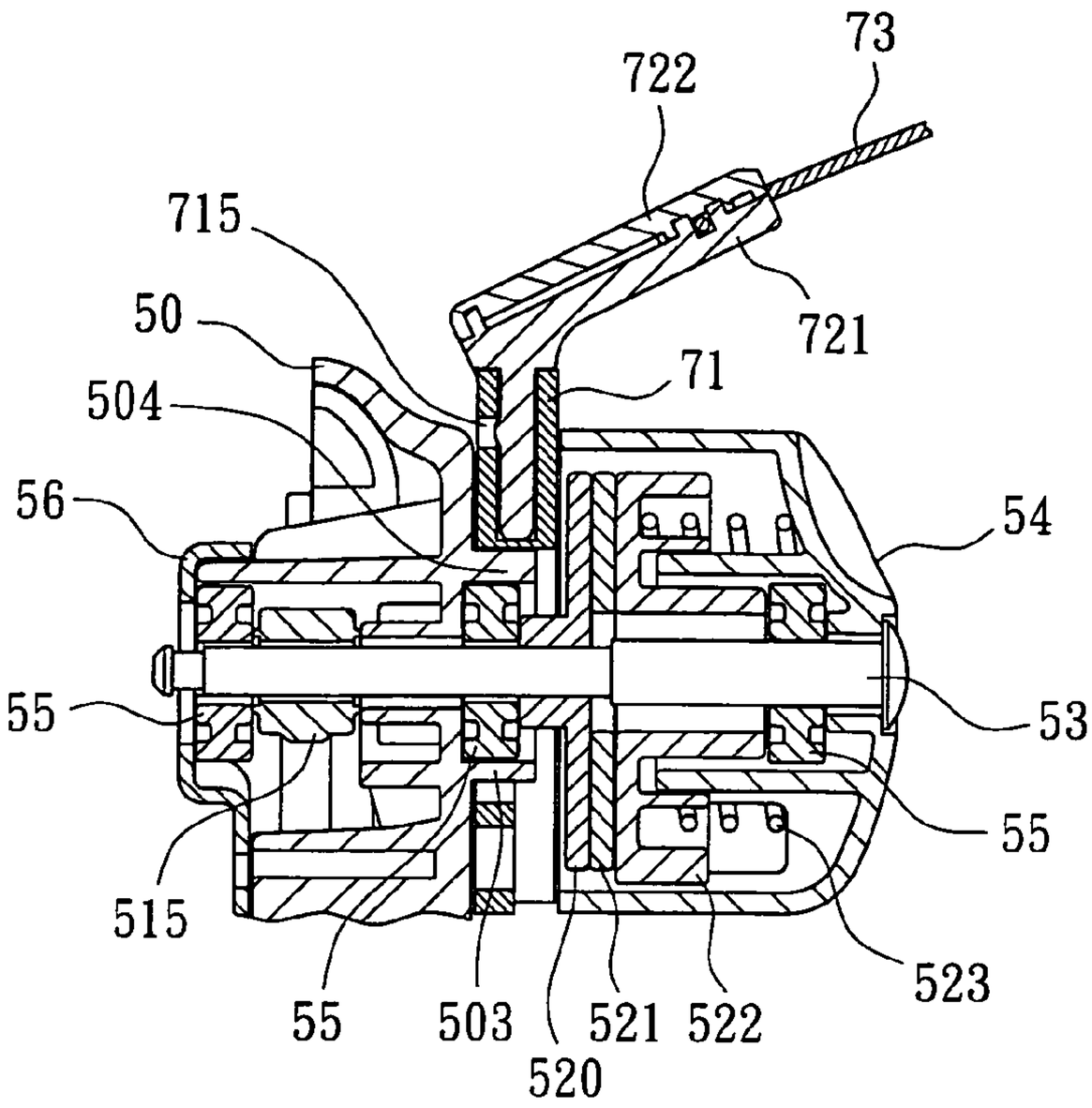
FIG. 27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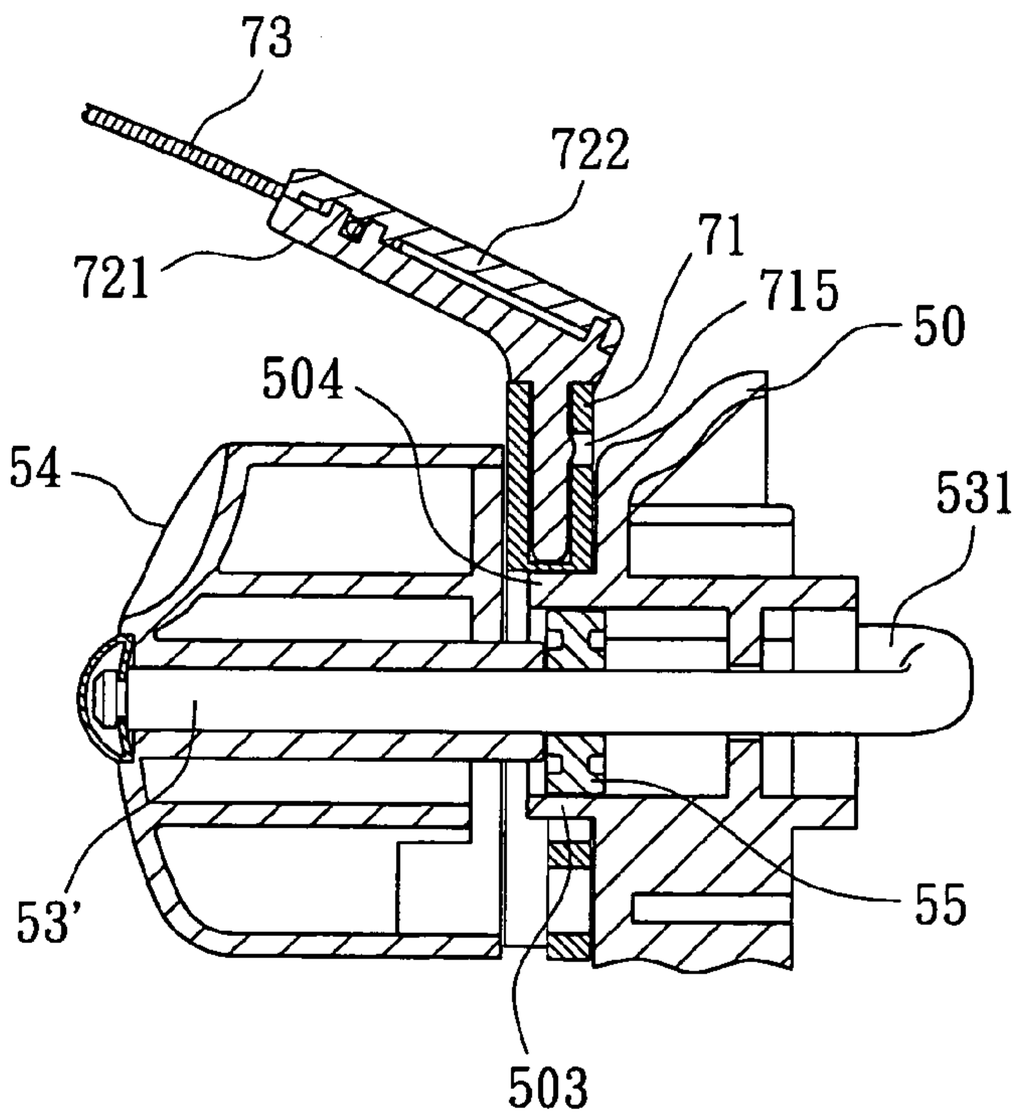
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FIG. 30

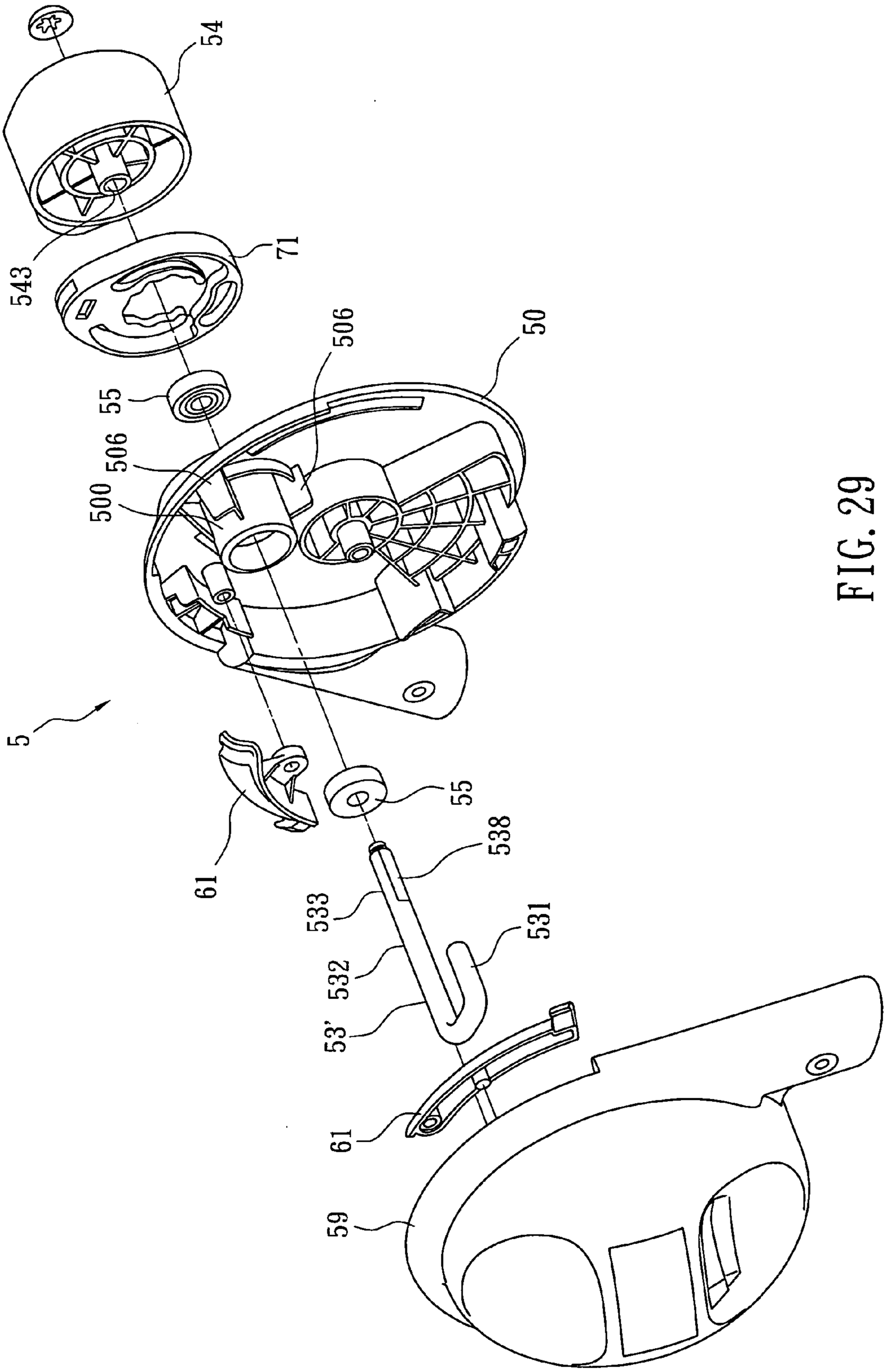

FIG. 29

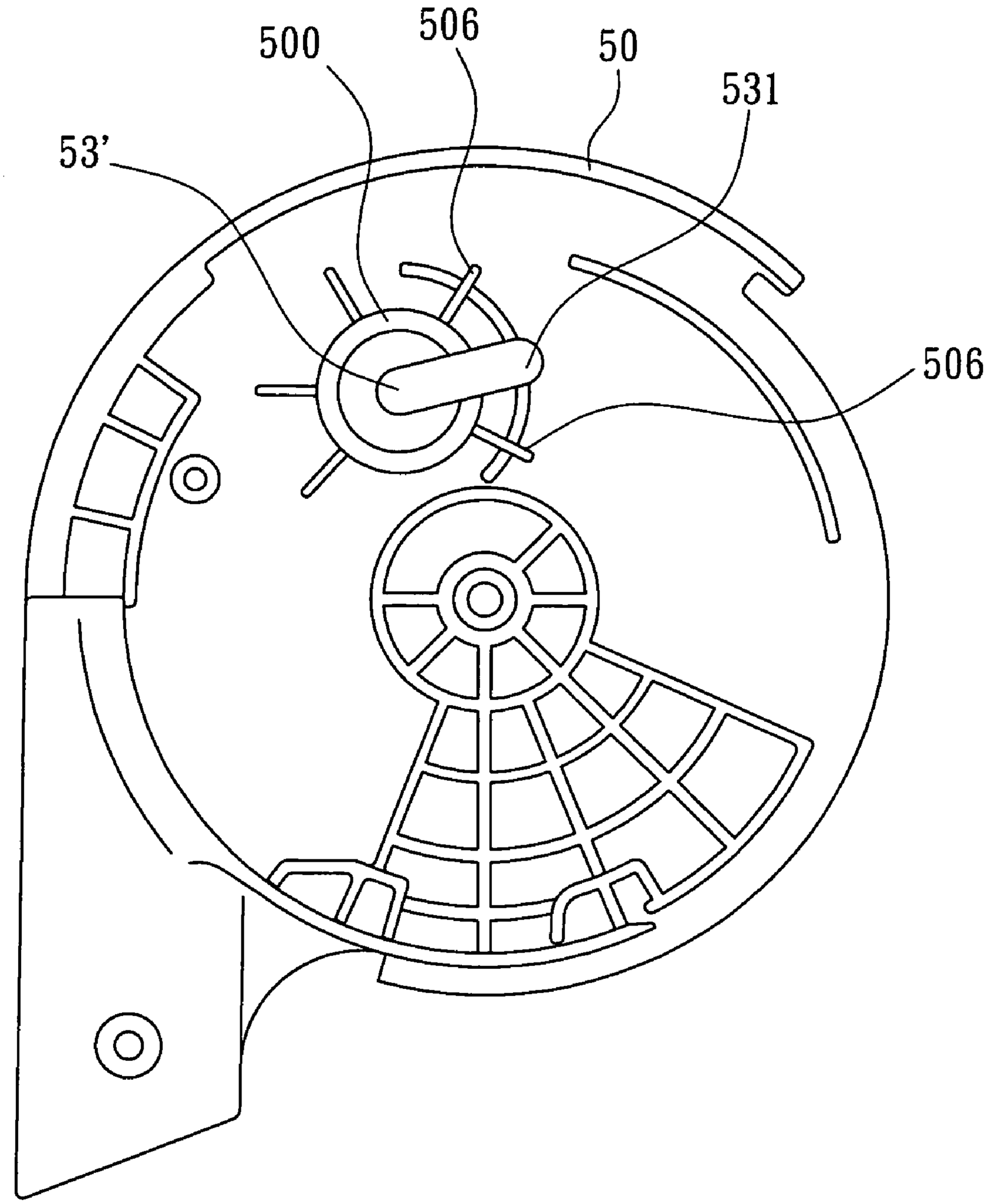

FIG. 31

OSCILLATING DEVICE FOR CHILDREN'S SWING APPARATUS

FIELD OF THE INVENTION

The present invention generally relates to a swing apparatus for children and an oscillating device therein, and more particularly to a swing apparatus and an oscillating device driven by a friction piece.

BACKGROUND OF THE INVENTION

FIG. **1** is a partially assembled view which illustrates a conventional swing assembly **1** for children disclosed in U.S. Pat. No. 6,872,146 B1. The rotor of a motor **10** in the FIG. **1** is connected to a worm **11** which meshes with a worm gear **12**. One end of a sliding rod **13** is pivotally connected to one side face of the worm gear **12** and another end of the sliding rod **13** is pivotally connected to a pivoting piece **14**. The pivoting piece **14** is also used to secure one end of a spring **15**.

When the motor **10** rotates, its movement is sequentially transmitted through the worm **11**, the worm gear **12**, the sliding rod **13** and the pivoting piece **14** to the spring **15**. Because another end of the spring **15** contacts the a stopper **16**, the restoration force resulting from deformation of the spring **15** is transmitted through the pivoting piece **14** and the sliding rod **13** to the worm gear **12** such that a swing rod **17** swings at a predetermined angle like a pendulum. Hence, a sitting device connected to the swing rod **17** at lower end thereof can be swung relative to a skeleton **18**.

However, when the weight of the child in the sitting device exceeds the rated load of the motor **10**, the sitting device is blocked by miscellaneous articles from being swung, or another child outside the sitting device intentionally holds the sitting device, the sitting device looks stationary but the motor **10** is still electrically active. Therefore, the motor **10** will be damaged due to overloaded current.

Besides, if outage happens or electric power is suddenly cut off when the sitting device is swung to a place other than the lowest position, the sitting device will fixedly stop at a relatively higher position immediately. This situation is similar to emergently braking a car, which causes the child in the sitting device to tilt forward or backward unexpectedly. In addition, the orientation of sitting device at that position makes the child therein uncomfortable

Furthermore, the conventional swing assembly **1** is not equipped with a shielding device so that the conventional swing assembly **1** is not suitable for being used under the sun.

SUMMARY OF THE INVENTION

Accordingly, the present invention relates to a swing apparatus for children and an oscillating device therein that are substantially intended to obviate one or more of the problems due to the limitations and disadvantages encountered in the prior art.

One object of the present invention is to provide a swing apparatus for children and an oscillating device therein whose motor still can normally work to avoid from being damaged when the load on the seat frame exceeds rated capacity of the motor.

Another object of the present invention is to provide a swing apparatus for children and an oscillating device therein which can cushion the movement of the seat frame and avoid sudden stop of the seat frame when electric power is suddenly cut off.

Yet another object of the present invention is to provide a wing apparatus for children and an oscillating device therein which allow the seat frame to descend to a lower position when electric power is suddenly cut off.

Further object of the present invention is to provide a wing apparatus for children which is suitable for being used under the sun.

Additional features and advantages of the invention will be set forth in the description which follows, and in portion will be apparent from the description, or may be learned by practice of the invention. The objectives and advantages of the invention will be realized and attained by the structure as particularly set forth in the written description and claims as well as illustrated in the appended drawings.

These objects are achieved by an oscillating device as defined by the claim **1** and a swing apparatus as defined by the claims **11** and **17**. The dependent claims define preferred or advantageous embodiments of the oscillating device and the swing apparatus.

The present invention provides an oscillating device used in combination with a swing apparatus. The oscillating device comprises a base; a driving assembly mounted to the base; an output piece pivotally connected to the base, the driving assembly operatably driving the output piece to oscillate relative to the base; and a transmitting assembly which includes a first friction piece, the first friction piece is driven to oscillate back and forth by the driving assembly and moves relative to or together with the output piece depending on a friction force therebetween.

Another aspect of the present invention is to provide a swing apparatus for children. The swing apparatus comprises a first frame, a second frame, and an oscillating device connecting the first frame with the second frame. The oscillating device includes: a base connected to the first frame; a driving assembly mounted to the base; an output piece pivotally connected to the base; and a transmitting assembly further including a first friction piece which is driven to oscillate back and forth by the driving assembly; whereby the first friction piece moves relative to or together with the output piece depending on a friction force therebetween, and the driving assembly operatably cooperates the second frame to swing relative to the first frame.

Further aspect of the present invention is to provide a swing apparatus for children. The swing apparatus comprises: a first frame; a second frame; and an oscillating device connecting the first frame with the second frame, the oscillating device includes a base connected to the first frame, a driving assembly mounted to the base, an output piece secured to the second frame pivotally connected to the base, a transmitting assembly mounted between the driving assembly and the output piece, and a first shaft connected to the driving assembly and passing through the transmitting assembly; wherein the transmitting assembly includes a first friction piece secured to the first shaft, and a second friction piece un-rotatably connected to output piece; when the first shaft is driven to rotate relative to the base by the driving assembly, the first friction piece is moved together with the first shaft, and the second friction piece is driven to rotate relative to the base by the friction between the first friction piece and the second friction piece so that the second frame is driven to oscillate back and forth relative to the first frame.

Moreover, the transmitting assembly includes a second friction piece which is for cooperating the output piece and an elastic piece which urges against one of the first friction piece and the second friction piece; the first friction piece moves relative to or together with the second friction piece depending on the friction force therebetween.

In a preferred aspect, the first friction piece includes a first rough face and the second friction piece includes a second rough face; the first rough face faces the second rough face.

It is another preferred feature that the first friction piece has a first friction face; the output piece has a second friction face which contacts the first friction face, the first friction face and the second friction face are cambered surfaces with different curvatures.

Additionally, the oscillating device comprises a first shaft which passes through the transmitting assembly and has a first plane; the first friction piece further includes a first central orifice adapted to the first plane; the first shaft is received in the first central orifice such that the first friction piece and the first shaft move together.

Furthermore, the driving assembly includes an actuator which is secured to the base, a driver which is connected to the actuator, a follower which is connected to the driver, and two links which are pivotally connected with each other and respectively connected to the follower and the first shaft; one of the two links includes a second central orifice adapted to the first plane; the first shaft is received in the second central orifice such that the one of the two links and the first shaft move together.

It is preferred that the transmitting assembly further includes a packing with two opposite side faces which respectively contact the first rough face and the second rough face.

It is preferred that the oscillating device further comprises a first shaft which passes through the transmitting assembly and has a first plane; the second friction piece further includes a third central orifice adapted to the first plane; the first shaft is received in the third central orifice such that the second friction piece and the first shaft move together.

It is preferred that the first shaft includes a second plane; the output piece includes a fourth central orifice adapted to the second plane; the first shaft is received in the fourth central orifice such that the first shaft and the output piece move together.

It is preferred that the driving assembly further includes an actuator which is secured to the base, a driver which is connected to the actuator, a follower which is connected to the driver, and a link which connects the follower to the first friction piece; the elastic piece urges against the first friction piece.

It is preferred that the transmitting assembly further includes a second friction piece which is for cooperating the second frame and an elastic piece which urges against one of the first friction piece and the second friction piece; the first friction piece moves relative to or together with the second friction piece depending on the friction force therebetween.

It is preferred that the swing apparatus further comprises a shielding device which is pivotally mounted to the oscillating device.

It is preferred that the oscillating device further comprises a first shaft which passes through the transmitting assembly and has a first plane; the first friction piece further includes a first central orifice adapted to the first plane; the first shaft is received in the first central orifice such that the first friction piece and the first shaft move together.

It is preferred that the oscillating device includes a second shaft and another base; the second shaft has a bent first section and the another base has two blockers; the bent first section moves between the two blockers so that the moving range of the second shaft and the output piece is restricted.

It is preferred that the driving assembly includes a sensor which is secured to the base, an actuator which is secured to the base for supplying power to the transmitting assembly, a driver which is connected to the actuator, a follower which is connected to the driver, and a link device which are pivotally connected to the follower and a first shaft which passes through the transmitting assembly, the sensor is configured to sense the movement of the link device so as to control the output of the actuator.

It is preferred that the first friction piece includes a first rough face and the second friction piece includes a second rough face; the transmitting assembly further includes a packing with two opposite side faces which respectively contact the first rough face and the second rough face.

The swing apparatus and the oscillating device according to the present invention has the following advantages: the motor will not be damaged due to overloaded current, the second frame may be gradually stopped, the sitting device may be stopped on a lower place when electric power is suddenly cut off, and the swing apparatus is also suitable for being utilized under the sun.

It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide a further non-limiting explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of the invention and constitute a portion of the specification, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings:

FIG. **1** is a partially assembled view illustrating a conventional swing assembly;

FIG. **2** is an assembled prospective view illustrating a swing apparatus for children according to the present invention;

FIG. **3** is an exploded prospective view illustrating an oscillating device (without the first cover) in the swing apparatus according to the first preferred embodiment of the present invention;

FIG. **4** is an assembled prospective view illustrating the oscillating device (without the first cover) in the swing apparatus according to the first preferred embodiment of the present invention;

FIG. **5** is an assembled side view illustrating the swing apparatus (without the first cover) according to the first preferred embodiment of the present invention, wherein the second frame is swung to a first (back) position;

FIG. **6** is an enlarged view illustrating the oscillating device in the FIG. **5**;

FIG. **7** is an assembled side view illustrating the swing apparatus (without a first cover) according to the first preferred embodiment of the present invention, wherein the second frame is swung to a second (forth) position;

FIG. **8** is an enlarged view illustrating the oscillating device in the FIG. **7**;

FIG. **9** is an exploded prospective view illustrating an oscillating device (without the first cover) in the swing apparatus according to the second preferred embodiment of the present invention;

FIG. **10** is an assembled prospective view illustrating the second friction piece and output member shown in the FIG. **9**;

FIG. **11** is a prospective view illustrating the output member shown in the FIG. **9**;

FIG. **12** is an assembled side view illustrating the swing apparatus (without the first cover) according to the second preferred embodiment of the present invention, wherein the second frame is swung to a first (back) position;

FIG. **13** is an enlarged view illustrating the oscillating device in the FIG. **12**;

FIG. **14** is a side view illustrating the first friction piece meshes the second friction piece shown in the FIG. **9**;

FIG. **15** is a side view illustrating the first friction piece does not mesh the second friction piece shown in the FIG. **9**;

FIG. **16** is an assembled side view illustrating the swing apparatus (without the first cover) according to the second preferred embodiment of the present invention, wherein the second frame is swung to a second (forth) position;

FIG. **17** is an enlarged view illustrating the oscillating device in the FIG. **16**;

FIG. **18** is an exploded prospective view illustrating an oscillating device (without the first cover) in the swing apparatus according to the third preferred embodiment of the present invention;

FIG. **19** is an exploded prospective view illustrating the output member and transmitting assembly shown in the FIG. **18**;

FIG. **20** is an assembled prospective view of the first shaft, output member and transmitting assembly shown in the FIG. **18**;

FIG. **21** is a side view of the FIG. **20**;

FIG. **22** is a sectional view taken along line XXII-XXII in the FIG. **21**;

FIG. **23** is an assembled prospective view illustrating a swing apparatus for children according to the fourth embodiment of the present invention;

FIG. **24** is a front view illustrating the oscillating device, in which the first cover is not shown, in one side of the swing apparatus for children according to the fourth embodiment of the present invention;

FIG. **25** is an exploded perspective view illustrating the driving assembly of the oscillating device in one side of the swing apparatus for children according to the fourth embodiment of the present invention;

FIG. **26** is an exploded perspective view illustrating the transmitting assembly of the oscillating device in one side of the swing apparatus for children according to the fourth embodiment of the present invention;

FIG. **27** is an exploded perspective view illustrating the shielding device shown in the FIG. **23**;

FIG. **28** is a partially sectional assembled view illustrating the oscillating device in one side of the FIG. **23**;

FIG. **29** is an exploded perspective view illustrating the driving assembly of the oscillating device in another side of the swing apparatus for children according to the fourth embodiment of the present invention;

FIG. **30** is a partially sectional assembled view illustrating the oscillating device in another side of the FIG. **23**; and

FIG. **31** is an assembled front view illustrating the base and the second shaft in the FIG. **29**.

DETAILED DESCRIPTION OF THE INVENTION

The First Preferred Embodiment

As shown in FIGS. **2** and **3**, the swing apparatus **2** for children according to the first preferred embodiment of the present invention comprises a first frame **3**, a second frame **4** and an oscillating device **5**. The first frame **3** may include two U-shaped frame bodies.

The oscillating device **5** connects the first frame **3** with the second frame **4**. The second frame **4** may further include a seat portion **40**, a backrest **41** and a hanger arm **42**, which are connected with one another. Soft good or a sitting device (not shown) is fixed to the seat portion **40** and the backrest **41** for a child to sit in.

The oscillating device **5** includes a base **50**, a driving assembly **51**, a transmitting assembly **52**, a first shaft **53**, an output member **54**, two supporting pieces (such as bearings) **55**, a second cover **56**, a washer **57**, a retainer (such as a plum-blossom-shaped washer) **58** and a first cover **59**.

The base **50** has a cuff **500** with about three-fourth circle near upper end and a hole **501** at the center of the circle.

The driving assembly **51** further includes an actuator (such as a motor) **510** fixed to the base **50**, a driver (such as a worm) **511** connected to or used as the rotor of the actuator **510**, a follower (such as a worm gear) **512** engaged with the driver **511**, and a link **513**.

The transmitting assembly **52** further includes an elastic piece (such as a spring) **523**, a first friction piece **520**, a packing **521** and a second friction piece **522**, which are sequentially distributed.

The first friction piece **520** includes an ear **525** extending away from the circumference thereof, and a first rough face **526** situated at one side thereof.

The second friction piece **522** includes two opposite fourth planes **527** formed in the central orifice thereof, and a second rough face **528** situated at one side thereof.

The first shaft **53**, according to the sizes of diameters, includes a first section **531** as a head portion, a second section **532** with two opposite second planes **537** within full length, a third section **533** with two opposite first planes **538** within partial length, a fourth section **534** with the smallest diameter, and a fifth section **535** as a tail portion.

Assembling

As shown in FIGS. **3** and **4**, the first shaft **53** is inserted into the output member **54** through the central orifice thereof first. Because the output member **54** has two opposite third planes **543** in the central orifice thereof, the second planes **537** of the second section **532** will abut against the third planes **543** so that the output member **54** and the first shaft **53** are unable to rotate relative to each other.

Next, the subassembly of the output member **54** and the first shaft **53** is mounted to the base **50**. Specifically, The third section **533** of the first shaft **53** passes through the hole **510** of the upper portion of the base **50** so that the output member **54** and the third section **533** of the first shaft **53** are respectively situated at two opposite sides of the base **50**.

Thereafter, one of the supporting pieces **55** is put into the cuff **500** and sleeved on the first shaft **53** at the third section **533** other than the first planes **538**. Subsequently, the second friction piece **522**, the packing **521**, the first friction piece **520**, elastic piece **523**, another supporting piece **55**, the second cover **56**, and the washer **57**, each with a central orifice, are sequentially sleeved on the third section **533** at the portion of the first planes **538**. Among the elements sleeved on the first planes **538**, only the second friction piece **522** is provided with two opposite fourth planes **527** within the central orifice thereof, which aims at being engaged with the first planes **538** of the first shaft **53**. In view of this, the second friction piece **522** and the first shaft **53** is unable to rotate relative to each other while the packing **521**, the first friction piece **520** and the elastic piece **523** can rotate relative to the first shaft **53**.

Finally, the retainer **58** is snapped on the first shaft **53** at the fourth section **534** such that all elements sleeved on the first shaft **53** cannot be released from the first shaft **53** and the base **50**.

On the other hand, the actuator **510** is secured to the base **50** at the lower portion. After that, the follower **512** is pivotally connected to the base **50** and engaged with the driver **511**.

Then, two ends of the link **513** are pivotally connected respectively to the other side of the follower **512** and the ear **525** of the first friction piece **520**.

Moreover, the first cover **59** with electric switches **590** is installed to the base **50** and thus the assembling about the oscillating device **5** in the swing apparatus **2** for children is accomplished.

As shown in the FIG. **2**, if the first frame **3** is further mounted below the base **50** and the hanger arm **42** of the second frame **4** is fastened to the output member **54**, then the swing apparatus **2** for children according to the present invention is totally assembled. Incidentally, the swing apparatus **2** may be equipped with, for example, only one complete oscillating device **5** at one side of the swing apparatus **2**, i.e., another oscillating device **5** at another side of the swing apparatus **2** does not include the driving assembly **51** and the transmitting assembly **52**.

Operation and Effect

As shown in FIGS. **3**, **5** and **6**, when one of the electric switches **590** (FIG. **2**) is pressed, electric current flows through electric circuit (not shown) to start the actuator **510**. The movement of the actuator **510** is sequentially transmitted to the driver **511**, the follower **512**, link **513**, and the first friction piece **520**. In the meantime, the follower **512** continuously rotates in one direction while the first friction piece **520** can only repeatedly oscillates within a predetermined angular range.

Furthermore, since the first rough face **526** of the first friction piece **520** and the second rough face **528** of the second friction piece **522** respectively face two sides of the packing **521**, the first friction piece **520** and the second friction piece **522** will tightly abut respectively against the two side faces of the packing **521** due to elastic force of the elastic piece **523**. Consequently, the oscillating movement of the first friction piece **520** can be transmitted to the packing **521** and further to the second friction piece **522** by means of the friction forces existing on the faces contacting each other. When the load, which may include weights of the second frame **4**, sitting device, child and miscellaneous articles, on the second frame **4** is smaller than the friction force in the transmitting assembly **52**, the first friction piece **520**, the packing **521** and the second friction piece **522** shall not rotate relatively one another.

Because the fourth plane **527** of the second friction piece **522** matches the first plane **538** of the first shaft **53**, oscillating movement of the second friction piece **522** can be transmitted to the first shaft **53**. Similarly, the movement of the first shaft **53** can be transmitted to the output member **54** since the second plane **537** of the first shaft **53** matches the third plane **543** of the output member **54**. The output member **54** is allowed to oscillate relative to the base **50** and then the movement of the output member **54** is transmitted to the second frame **4** via the hanger arm **42**. As a result, the second frame **4** and the sitting device thereon can swing back and forth within a predetermined angular range, such as the first (back) position illustrated in the FIG. **5** and the second (forth) position illustrated in the FIG. **7**. Incidentally, the two supporting pieces **55** are used to support the first shaft **53** respectively at two ends thereof to help the oscillation movement smoother.

In the transmitting assembly **52** of the present invention, the first rough face **526**, the packing **521** and the second rough face **528** have friction coefficients depending on material and roughness thereof so that when the elastic piece **523** applies normal force to the first friction piece **520**, there are friction forces on the contacting faces during oscillating movement. Therefore, if the load on the second frame **4** is smaller than the maximum static friction force on the contacting faces, the movement of the driving assembly **51** can be transmitted through the transmitting assembly **52** to the output member **54** so as to swing the second frame **4**. Specifically, when the load on the second frame **4** is smaller than the maximum static friction force between the first friction piece **520** and the packing **521**, the link **513** drives the first friction piece **520** and then the first friction piece **520** frictionally drives the packing **521** via the friction force. When the load on the second frame **4** is also smaller than the maximum static friction force between the packing **521** and the second friction piece **522**, the packing **521** also frictionally drives the second friction piece **522** via the friction force. The second friction piece **522** further cooperates the first shaft **53** so that the output member **54** is co-moved by the first shaft **53**.

On the contrary, when the load on the second frame **4** is larger than the maximum static friction force among the first rough face **526**, the packing **520** and the second rough face **528**, then the first friction piece **520** will rotate relative to the packing **521** and/or the packing **521** will rotate relative to the second friction piece **522**. In other words, the second friction piece **522** is stationary. In this case, although the driving assembly **51** continuously operates, the movement thereof can only be transmitted to the first friction piece **520** or even to the packing **521** but by no means to the second friction piece **522**. Hence, the second friction piece **522**, the first shaft **53**, the output member **54** and the second frame **4** are all stationary. Because the actuator **510** is kept in normally operating state at this time, it will not break down due to overload.

In another aspect, if blackout happens or the power is suddenly switched off during oscillation of the second frame **4**, on the ground that resultant force of the normal load and inertia force of the second frame **4** is larger than the maximum friction force, the first friction piece **520**, the packing **521** or the second friction piece **522** may rotate relatively one another so that the second frame **4** may swing further by a small angle rather than suddenly stop like emergently braking a car. Besides, the maximum static friction force on the contacting faces turns into smaller kinetic friction force, which may be also smaller than the load on the second frame **4**, such that the second friction piece **522** perhaps rotate relative to the packing **521** or the first friction piece **520** due to the load itself on the second frame **4** and thus the second frame **4** may gradually descend near the lowest position.

The material of the packing **521** may be rubber, the packing **521** may be omitted from the transmitting assembly **52** in another embodiment, and the first and second friction pieces **520**, **522** may be respectively made of different materials, all of which can achieve the objects and effects according to the present invention.

The Second Preferred Embodiment

The difference between the swing apparatuses **2** of the first and second preferred embodiments of the present application only exists in some structure and assembling process of the oscillating device **5**. As to the first frame **3** and the second frame **4**, the two embodiments have the same structure and assembling process. Therefore, only the difference is described in the following second embodiment.

As shown in the FIG. **9**, the oscillating device **5** in the second preferred embodiment includes a base **50**, a driving assembly **51**, a transmitting assembly **52**, a first shaft **53**, an output member **54**, three supporting pieces (such as bearings) **55**, a second cover **56**, a washer **57**, a retainer (such as a plum-blossom-shaped washer) **58** and a first cover **59** (FIG. **2**).

The base **50** has a cuff **500** with about three-fourth circle near upper end, a hole **501** at the center of the circle, and a pillar **502** formed at the center of the base **50**.

The driving assembly **51** includes an actuator (such as a motor) **510** fixed to the base **50**, a driver (such as a worm) **511** connected to or used as the rotor of the actuator **510**, a follower (such as a worm gear) **512** engaged with the driver **511**, a first link **514** pivotally connected to the follower **512**, and one end of a second link **515** pivotally connected to the first link **514**. The second link **515** at the other end thereof has a bore and two opposite sixth planes **517** within the bore.

The transmitting assembly **52** includes a first friction piece **520**, a second friction piece **522** and an elastic piece (such as a spring) **523**, which are sequentially distributed. The first friction piece **520** has two opposite fifth planes **5201** formed in the central orifice thereof and a first tooth face **5202** (functioning as the first rough face) formed on one side face thereof. The second friction piece **522** has a second tooth face **5221** (functioning as the second rough face) formed on one side face thereof, a plurality of flanges **5222** (FIG. **10**) extending from opposite side thereof and distributed in a ring shape, and a plurality of slots **5223** (FIG. **10**) respectively defined by any two adjacent flanges **5222**. Both the first tooth face **5202** and second tooth face **5221** have a plurality of crown teeth distributed radically.

The first shaft **53**, according to the sizes of diameters, includes a first section **531** functioning as a head portion, a second section **532** without any plane within full length, a third section **533** with two opposite first planes **538** within full length, a fourth section **534** with the smallest diameter, and a fifth section **535** functioning as a tail portion. The second section **532** and the cylindrical portion of the third section **533** have the same diameter.

The output member **54** has a plurality of ribs **544** (FIG. **11**) radically distributed around the central orifice thereof but there is no the third plane **543** in the first embodiment within the central orifice.

The second cover **56** includes a cap **561**, a plate **562** extending away from the cap **561**, and an aperture **563** formed in the free end of plate **562**.

Assembling

At first, the first shaft **53** is inserted into the output member **54** through the central orifice thereof. Next, the first supporting piece **55**, the elastic piece **523**, the second friction piece **522** and the first friction piece **520** are sequentially sleeved on the first shaft **53** such that two ends of the elastic piece **523** respectively urge against the output member **54** and the second friction piece **522** at its side with the flange **5222**, and such that the second tooth face **5221** of the second friction piece **522** abuts against the first tooth face **5202** of the first friction piece **520**. Thereafter, the first shaft **53** in the subassembly described above is inserted into the hole **501** of the base **50** so that the output member **54**, the first supporting piece **55**, the elastic piece **523**, the second friction piece **522** and the first friction piece **520** are positioned at one side of the base **50**, while part of the third section **533**, the fourth section **534** and the fifth section **535** of the first shaft **53** are situated at another side of the base **50** and received within the cuff **500**.

Subsequently, the second supporting piece **55**, one end of the second link **515** with the sixth plane **517**, the third supporting piece **55**, the cap **561** of the second cover **56**, the washer **57** and the retainer **58** are sequentially sleeved on the first shaft **53**. Among the elements that are mounted on the first shaft **53**, except that the output member **54** and the first supporting piece **55** are sleeved on the second section **532** of the first shaft **53** and the retainer **58** clips the first shaft **53** at the fourth section **534**, the others are sleeved on the first shaft **53** at the third section **533**. In addition, the pillar **502** of the base **50** is accommodated within the aperture **563** of the second cover **56**.

Nevertheless, among the elements that are mounted on the first shaft **53**, only the second link **515** with the sixth plane **517** and the first friction piece **520** with the fifth plane **5201** abut against the first plane **538** of the first shaft **53**. Accordingly, the first shaft **53** will always move together with the second link **515** as well as the first friction piece **520**. As far as the other elements mounted on the first shaft **53**, because they have no planes to abut against the first plane **538** of the first shaft **53**, the first shaft **53** can rotate relative to them.

On the other hand, the actuator **510** is secured to the lower portion of the base **50**. After that, the follower **512** is pivotally connected to the base **50** and engaged with the driver **511**. Then, two ends of the first link **514** are pivotally connected respectively to a side face of the follower **512** and another end of the second link **515**.

Moreover, the first cover **59** with the electric switches **590** is installed to the base **50** and secured to the pillar **502**. The assembling about the oscillating device **5** in the swing apparatus **2** for children is now accomplished.

Operation and Effect

As shown in FIGS. **9**, **12** and **13**, when one of the electric switches **590** (FIG. **2**) is pressed, electric current flows through electric circuit (not shown) to start the actuator **510**. The movement of the actuator **510** is sequentially transmitted to the driver **511**, the follower **512**, the first link **514**, the second link **515**, the first shaft **53** and the first friction piece **520**. In the meantime, the follower **512** continuously rotates in one direction while the first friction piece **520** can only repeatedly oscillates within a predetermined angular range.

Furthermore, the corresponding crown teeth on the first tooth face **5202** of the first friction piece **520** and the second tooth face **5221** of the second friction piece **522** will tightly mesh each other due to elastic force of the elastic piece **523**. Specifically, as shown in the FIG. **14**, the tooth ends and root ends on the first tooth face **5202** of the first friction piece **520** respectively abut against the root ends and tooth ends on the second tooth face **5221** of the second friction piece **522**, and the tooth flanks on the first tooth face **5202** abut against the tooth flanks on the second tooth face **5221**. Consequently, when the load, which may includes weights of the second frame **4**, sitting device, child and miscellaneous articles, on the second frame **4** is smaller than the meshing force of friction force between corresponding crown teeth in the transmitting assembly **52**, the first friction piece **520** and the second friction piece **522** cannot rotate relative to each other so that the movement of the first friction piece **520** can be transmitted to the second friction piece **522**. Furthermore, because the ribs **544** of the output member **54** are respectively accommodated within the slots **5223** on another side face of the second friction piece **522** and almost abut against the flanges **5222** (FIG. **10**), the movement of the second friction piece **522** can be transmitted to the output member **54**.

The output member **54** can rotate relative to the base **50**. The oscillation movement of the output member **54** can be transmitted to the second frame **4** via the hanger arm **42** in order to make the second frame **4** and the sitting device secured thereon swing back and forth within a predetermined angular range, such as the first (back) position illustrated in the FIG. **12** and the second (forth) position illustrated in the FIG. **16**. Incidentally, the three supporting pieces **55** are used to support the first shaft **53** respectively at two ends and middle portion thereof to help the oscillation movement smoother.

On the contrary, when the load on the second frame **4** is larger than the meshing force or maximum static friction force between the first tooth face **5202** and the second tooth face **5221**, then the first friction piece **520** will rotate relative to the second friction piece **522**. In other words, as shown in the FIG. **15**, the tooth flanks on the first tooth face **5202** slide relative to the tooth flanks on the second tooth face **5221** to the extent that the tooth ends on the first tooth face **5202** contact the tooth ends on the second tooth face **5221**. At the same time, the second friction piece **522** is further pressed into the output member **54**, i.e., the ribs **544** of the output member **54** are further inserted into the slots **5223** in the second friction piece **522**, so that the gap **545** between the second friction piece **522** and the output member **54** is decreased. When the first friction piece **520** keeps rotating, the states shown in the FIGS. **14** and **15** alternatively appear such that the second friction piece **522** can only slide back and forth along the first shaft **53** but cannot rotate together with the first shaft **53**. In this case, although the driving assembly **51** continuously operates, the movement thereof can only be transmitted through the first shaft **53** to the first friction piece **520** to make the first friction piece **520** swing within a predetermined angular range. Instead, the second friction piece **522** can only reciprocate in the axial direction of the first shaft **53** within a short distance but cannot be rotated by the first friction piece **520**. As to the output member **54** and the second frame **4** are all stationary. Because the actuator **510** is kept in normally operating state at this time, it will not break down due to overload.

In another aspect, if blackout happens or the power is suddenly switched off during oscillation of the second frame **4**, on the ground that resultant force of the normal load and inertia force of the second frame **4** is larger than the meshing force or maximum static friction force between the first tooth face **5202** and the second tooth face **5221**, the second friction piece **522** may rotate relative to the first friction piece **520** a little bit regardless of the stop of the first friction piece **520**. Therefore, the second frame **4** may swing further by a small angle rather than suddenly stop like emergently braking a car. Besides, the maximum static friction force on the tooth flanks of the crown teeth turns into smaller kinetic friction force, which may be also smaller than the load on the second frame **4**, such that the second friction piece **522** perhaps rotate relative to the first friction piece **520** due to the load itself on the second frame **4** and thus the second frame **4** may gradually descend to the lower position.

The Third Preferred Embodiment

The difference between the swing apparatuses **2** of the third and second preferred embodiments of the present application only exists in some structure and assembling process of the oscillating device **5**. As to the first frame **3** and the second frame **4**, their structure and assembling process are the same as those in the first and second embodiments. Therefore, only the difference is described in the following third embodiment.

As shown in the FIG. **18**, the oscillating device **5** in the third embodiment includes a base **50** (the same as that in the FIG. **9**), a driving assembly **51** (the same as that in the FIG. **9**), a transmitting assembly **52**, a first shaft **53** (the same as that in the FIG. **9**), an output member **54**, two supporting pieces (such as bearings) **55** (FIG. **9**), a second cover **56** (the same as that in the FIG. **9**), a washer **57** (the same as that in the FIG. **9**), a retainer (such as plum-blossom-shaped washer) **58** (the same as that in the FIG. **9**) and a first cover **59** (FIG. **2**).

As shown in the FIG. **19**, the transmitting assembly **52** includes a substantially cap-shaped first friction piece **520**. The first friction piece **520** has a first wall **5205** with a larger curvature radius, a second wall **5206** with a smaller curvature radius, a pair of parallel fifth planes **5201** formed the central orifice thereof, and a first friction plane **5207** (functioning as a first rough face) situated at the inner side of the first wall **5205**. In addition, the first wall **5205** and the second wall **5206** are joined with each other to form a closed loop. The first friction face **5207** is made of rubber or a rubber pad.

The output member **54** includes an inner first bush **546**, an outer second bush **547** substantially concentric with the first bush **546**, and a second friction face **548** formed on the lower half outer portion of the first bush **546** and functioning as a second rough face. The output member **54** in the third preferred embodiment additionally has the friction function the same as that of the second friction piece **522** in the first and second embodiments.

The curvatures (or curvature radiuses) of the first wall **5205**, the second wall **5206**, the first bush **546** and the second bush **547** are different from one another.

Assembling

As shown in the FIGS. **18**, **19** and **20**, at first, the first friction face **5207** of the first friction piece **520** is substantially aligned with the second friction face **548** of the output member **54**. Then, the first and second walls **5205**, **5206** of the first friction piece **520** are put into a space between the first and second bush **546**, **547** of the output member **54**. Next, the first shaft **53** is sequentially inserted into the central orifices of the output member **54** and the first friction piece **520** to the extent that the first plane **538** of the first shaft **53** faces the fifth plane **5201** of the first friction piece **520**. At this time, the first friction face **5207** of the first friction piece **520** frictionally contacts the second friction face **548** of the output member **54**. Thereafter, the subassembly described above is mounted to base **50** and the driving assembly **51**, where the mounting processes are the same as those in the second preferred embodiments.

Operation and Effect

As shown in FIGS. **18**, **21** and **22**, when one of the electric switches **590** (FIG. **2**) is pressed, the movement of the driving assembly **51** is transmitted to the first shaft **53** to make the first shaft **53** rotate in a predetermined angular range. Because the first plane **538** of the first shaft **53** abuts against the fifth plane **5201** of the first friction piece **520**, the first shaft **53** will co-rotate with the first friction piece **520** and cannot rotate alone relative to the first friction piece **520**. Furthermore, since the first friction face **5207** frictionally contacts the second friction face **548**, the first friction piece **520** will move together with the output member **54** when the load on the second frame **4** is smaller than the friction force between the first friction face **5207** and the second friction face **548**. Hence, the second frame **4** can be swung by the output member **54**.

On the contrary, when the load on the second frame **4** is larger than the friction force between the first friction face **5207** and the second friction face **548**, then the first friction piece **520** will rotate relative to the output member **54**. Therefore, although the driving assembly **51** continuously cooperates with the first shaft **53** and the first friction **520**, the output member **54** and the second frame **4** are still stationary. Because the actuator **510** is kept in normally operating state at this time, it will not break down due to overload.

The Fourth Preferred Embodiment

As shown in the FIG. **23**, the swing apparatus **2** for children according to the fourth preferred embodiment, which is more similar to the second embodiment, of the present invention

comprises a first frame **3**, a second frame **4**, an oscillating device **5** and a shielding device **7**. The first frame **3** may include two U-shaped frame bodies. The oscillating device **5** connects the first frame **3** with the second frame **4**.

The second frame **4** is similar to that described in the first preferred embodiment (FIG. **2**).

As shown in the FIGS. **24**, **25** and **26**, The oscillating device **5** includes a base **50**, a driving assembly **51**, a transmitting assembly **52**, a first shaft **53**, an output member **54**, three supporting pieces (such as bearings) **55**, a second cover **56**, a washer **57**, a retainer (such as a plum-blossom-shaped washer) **58**, a first cover **59** (FIG. **23**) and two sealing pieces **61**.

The base **50** has a cuff **500** with about three-fourth circle near upper end, a hole **501** at the center of the circle, an annulus **503** (FIG. **28**) formed on another side opposite to the side with the cuff **500**, and a plurality of bulges **504** (FIG. **28**) extending away from the outer surface of the annulus **503**.

As shown in the FIG. **25**, the driving assembly **51** further includes an actuator (such as a motor) **510** fixed to the base **50**, a driver (such as a worm) **511** connected to or used as the rotor of the actuator **510**, a follower (such as a worm gear) **512** engaged with the driver **511**, a first link **514** pivotally connected to the follower **512**, a second link **515** pivotally connected to the first link **514**, and a sensor **516** installed near the joint where the first link **514** pivotally connects with the second link **515**. The second link **515** has two fingers **519** extending from the joint and a trough **518** near the joint for pivotally connecting with the first link **514**. The second link **515** at another end thereof has a bore and two opposite sixth planes **517** within the bore.

As shown in the FIG. **26**, the transmitting assembly **52** further includes a first friction piece **520**, a packing **521**, a second friction piece **522** and an elastic piece (such as a spring) **523**, which are sequentially distributed.

The first shaft **53** is similar to that described in the second preferred embodiments (FIG. **9**).

The first friction piece **520** includes two opposite fifth planes **5201** formed in the central orifice thereof and a first rough face **526** formed on one side face thereof. The second friction piece **522** includes a second rough face **528** formed on one side face thereof, a plurality of flanges **5222** (FIG. **10**) extending from opposite side thereof and distributed in a ring shape, and a plurality of slots **5223** (FIG. **10**) respectively defined by any two adjacent flanges **5222**.

As showing in the FIG. **27**, the shielding device **7** includes a gripper **71**, a holder **72** and a canopy **73**. The canopy **73** has two cutouts **731** respectively formed at two opposite ends thereof.

The gripper **71** has a ring-like housing **711**, a port **714** formed in one end of the housing **711**, a window **715** communicating with the port **714**, two gripping portions **712** extending inwards from the end of the housing **711**, a plurality of notches **716** formed on one side of each gripping portions **712**, and a curved flute **713** formed at another end of the housing **711**.

The holder **72** has a first holding piece **721**, a second holding piece **722**, a stiffener **723** formed on the top face of the first holding piece **721**, a plug **724** extending away from the bottom face of the first holding piece **721**, and a bump **725** formed on the side face of the plug **724**.

Assembling of the Oscillating Device

As shown in the FIGS. **26** and **28**, at first, the first shaft **53** is inserted into the output member **54** through the central orifice thereof. Next, the first supporting piece **55**, the elastic piece **523**, the second friction piece **522**, the packing **521**, the first friction piece **520** and the gripper **71** are sequentially sleeved on the first shaft **53** such that two ends of the elastic piece **523** respectively urge against the output member **54** and the second friction piece **522** at its side with the flanges **5222**. Thereafter, the first shaft **53** in the subassembly described above is inserted into the hole **501** of the base **50** to the extent that the output member **54**, the first supporting piece **55**, the elastic piece **523**, the second friction piece **522**, the packing **521**, the first friction piece **520** and the gripper **71** are positioned at one side of the base **50** while part of the third section **533**, the fourth section **534** and the fifth section **535** of the first shaft **53** are situated at another side of the base **50** and received within the cuff **500**.

As shown in the FIGS. **24**, **25** and **28**, subsequently, the second supporting piece **55**, one end of the second link **515** with the sixth plane **517**, the third supporting piece **55**, the cap **561** of the second cover **56**, the washer **57** and the retainer **58** are sequentially sleeved on the first shaft **53**. Among the elements that are mounted on the first shaft **53**, except that the output member **54**, the first supporting piece **55**, the elastic piece **523**, the second friction piece **522** and the packing **521** are sleeved on the second section **532** of the first shaft **53** and the retainer **58** clips the first shaft **53** at the fourth section **534**, the others are substantially sleeved on the first shaft **53** at the third section **533**. In addition, the pillar **502** of the base **50** is accommodated within the aperture **563** of the second cover **56**.

As shown in the FIGS. **25**, **26** and **28**, among the elements that are mounted on the first shaft **53**, only the second link **515** with the sixth plane **517** and the first friction piece **520** with the fifth plane **5201** abut against the first plane **538** of the first shaft **53**. Accordingly, the first shaft **53** will always move together with the second link **515** as well as the first friction piece **520**. As far as the other elements mounted on the first shaft **53**, because they have no planes to abut against the first plane **538** of the first shaft **53**, the first shaft **53** can rotate relative to them.

As shown in the FIGS. **24** and **25**, on the other hand, the sensor **516** and actuator **510** are respectively secured to the base **50**. After that, the follower **512** is pivotally connected to the base **50** and engaged with the driver **511**. Then, two ends of the first link **514** are pivotally connected respectively to a side face of the follower **512** and within the trough **518** of the second link **515**.

Moreover, the sealing pieces **61**, which reduce the clearance between the base **50** and the first cover **59**, are mounted respectively on the base **50** and the first cover **59**. The first cover **59** with the electric switches **590** is installed to the base **50** and secured to the pillar **502**. The assembling about the oscillating device **5** in the swing apparatus **2** for children is now accomplished.

Assembling of the Shielding Device

As shown in the FIG. **27**, the plugs **724** of the first holding pieces **721** are respectively inserted into the ports **714** of the grippers **71** so that the bumps **725** on the plugs **724** are respectively accommodated within the windows **715** of the grippers **71**. Next, two ends of the canopy **73** are respectively set on the first holding pieces **721** so that the stiffener **723** on the first holding piece **721** are received within the cutouts **731** of the canopy **73**. After the second holding pieces **722** are placed on the canopy **73** near the cutouts **731**, the second holding piece **722**, the canopy **73** and the first holding piece **721** are fixed together by a fastener (not shown) such as a screw or rivet. The shielding device **7** in the swing apparatus **2** for children is thus completed and the shielding device **5** is pivotally mounted on the oscillating device **5** at the same time. Alternatively, the second holding piece **722** can be omit-

ted and the canopy **73** is directly secured onto the first holding piece **721**. Alternatively, the holder **72** and the gripper **71** may be integrally formed.

As shown in the FIGS. **23** and **2**, one swing apparatus **2** may be alternatively equipped with two different oscillating devices **5** at two sides thereof. One of the oscillating devices **5** has been described above. Another oscillating device **5** may not includes the driving assembly **51** (FIG. **9**) and the transmitting assembly **52** (FIG. **24**) but does includes a base **50** and a second shaft **53'** different from those described above. As shown in the FIG. **29**, the first section **531** of the second shaft **53'** is bent to be a U shape relative to the second section **532**. As to the base **50**, it may further include two blockers **506** extending away from the cuff **500** and spaced apart at a predetermined angle, such as 30 degrees.

Operation and Effect

As shown in the FIGS. **25** and **26**, when one of the electric switches **590** (FIG. **23**) is pressed, electric current flows through electric circuit (not shown) to start the actuator **510**. The movement of the actuator **510** is sequentially transmitted to the driver **511**, the follower **512**, the first link **514**, the second link **515** and the first friction piece **520**. In the meantime, the follower **512** continuously rotates in one direction while the first friction piece **520** can only repeatedly oscillates within a predetermined angular range.

Furthermore, since the first rough face **526** of the first friction piece **520** and the second rough face **528** of the second friction piece **522** respectively face two sides of the packing **521**, the first friction piece **520** and the second friction piece **522** will tightly abut respectively against the two side faces of the packing **521** due to elastic force of the elastic piece **523**. Consequently, the oscillating movement of the first friction piece **520** can be transmitted to the packing **521** and further to the second friction piece **522** by means of the friction forces existing on the faces contacting each other. When the load on the second frame **4** is smaller than the friction force in the transmitting assembly **52**, the first friction piece **520**, the packing **521** and the second friction piece **522** shall not rotate relatively one another. Therefore, the movement of the first friction piece **520** can be transmitted to the second friction piece **522**. Furthermore, because the ribs **544** of the output member **54** are respectively accommodated within the slots **5223** on another side face of the second friction piece **522** and almost abut against the flanges **5222** (FIG. **10**), the movement of the second friction piece **522** can be transmitted to the output member **54**.

The output member **54** can rotate relative to the base **50**. The oscillation movement of the output member **54** can be transmitted to the second frame **4** via the hanger arm **42** in order to make the second frame **4** and the sitting device secured thereon swing back and forth within a predetermined angular range.

When the sitting device is swung to a higher position where the sitting device is topmost in the stroke, one of two fingers **519** will be aligned with the sensor **516** and thus the sensor **516** senses the finger **519**. The sensor **516** then sends a signal to a circuit (not shown) installed within the oscillating device **5** so as to control the actuator **510** outputting a smaller torque. This is because the sitting device at the topmost position is going to be swung downwards by its gravity so that a larger torque outputted from the actuator **510** is unnecessary. On the contrary, when the sitting device is swung to a lower position in the stroke, both of the fingers **519** do not aligned with the sensor **516** and thus the sensor **516** does not sense any finger **519**. Thus, the sensor **516** sends another signal to the circuit (not shown) installed within the oscillating device **5** so as to control the actuator **510** outputting a larger torque. This is because the sitting device at the lower position is going to be swung upwards and thus needs external force so that a larger torque outputted from the actuator **510** is necessary. The fingers **519**, sensor **516** and related controlling circuit are helpful to save the electrical power and extend the lifespan of the battery.

As shown in the FIGS. **29**, **30** and **31**, alternatively, the blockers **506** of the base **50** situated at another side of the swing apparatus **2** can stop the movement of the second shaft **53'** by abutting the U-shaped first section **531** against either of the blockers **506**. Because the first plane **538** of the second shaft **53'** is engaged with the third plane **543** of another output member **54**, the movement of the another output member **54**, together with the second shaft **53'**, can be restricted by the blockers **506**. Hence, The U-shaped first section **531** and the blockers **506** have the function to avoid the first and second frame **3**, **4** from being swung over the predetermined range.

As shown in the FIGS. **27** and **28**, in another aspect, because the annulus **503** of the base **50** is received within the gripping portion **712** of the gripper **71** and the bulges **504** on the annulus **503** are situated within the notches **716** of the gripper **71**, the gripper **71** clips on the annulus **503** of the base **50** to make the canopy **73** adjustably mounted on the base **50** in a predetermined angle. When the adjustment about the angle of the canopy **73** relative the base **50** is necessary, the users only need to do is to rotate the holders **72**. Because the gripping portions **712** of the grippers **71** are elastically deformable, the bulges **504** on the annulus **503** can overcome the gripping force of the gripping portions **712** to change their relative positions and be received within another set of notches **716**. Therefore, the canopy **73** is situated on the base **50** in another angle. If the canopy **73** is unnecessary, the user can press the bump **725** to release the holder **72** from the gripper **71** and further detach the canopy **73** from the base **50**.

This invention has been disclosed in terms of specific embodiments. It will be apparent that many modifications can be made to the disclosed structures without departing from the invention. Therefore, it is the intent of the appended claims to cover all such variations and modifications that are within the breadth and scope of this invention.

What is claimed is:

1. An oscillating device for children's swing apparatus comprising:

a base;

a driving assembly mounted to the base;

an output piece pivotally connected to the base via a first shaft, the driving assembly operably driving the output piece to oscillate relative to the base; and

a transmitting assembly which includes a first friction piece, the first friction piece being coupled to the base by the first shaft, the first friction piece being driven to oscillate back and forth by the driving assembly, wherein a magnitude of a friction force between the first friction piece and the output piece determines whether the first friction piece moves relative to or together with the output piece.

2. The oscillating device used in combination with a swing apparatus as claimed in the claim **1**, wherein the transmitting assembly includes a second friction piece which is for cooperating the output piece and an elastic piece which urges against one of the first friction piece and the second friction piece; the first friction piece moves relative to or together with the second friction piece depending on a magnitude of a friction force therebetween.

3. The oscillating device used in combination with a swing apparatus as claimed in the claim **2**, wherein the first friction

piece includes a first rough face and the second friction piece includes a second rough face; the first rough face opposingly facing the second rough face.

4. The oscillating device used in combination with a swing apparatus as claimed in the claim **3**, wherein the transmitting assembly further includes a packing with two opposite side faces which respectively contact the first rough face and the second rough face.

5. The oscillating device used in combination with a swing apparatus as claimed in the claim **2**, wherein the first shaft passes through the transmitting assembly and has a first plane; the second friction piece further includes a third central orifice adapted to the first plane; the first shaft is received in the third central orifice such that the second friction piece and the first shaft move together.

6. The oscillating device used in combination with a swing apparatus as claimed in the claim **5**, wherein the first shaft includes a second plane; the output piece includes a fourth central orifice adapted to the second plane; the first shaft is received in the fourth central orifice such that the first shaft and the output piece move together.

7. The oscillating device used in combination with a swing apparatus as claimed in the claim **6**, wherein the driving assembly further includes an actuator which is secured to the base, a driver which is connected to the actuator, a follower which is connected to the driver, and a link which connects the follower to the first friction piece; the elastic piece urges against the first friction piece.

8. The oscillating device used in combination with a swing apparatus as claimed in the claim **1**, wherein the first friction piece has a first friction face; the output piece has a second friction face which contacts the first friction face, the first friction face and the second friction face are cambered surfaces with different curvatures.

9. The oscillating device used in combination with a swing apparatus as claimed in the claim **1**, wherein the first shaft passes through the transmitting assembly and has a first plane; the first friction piece further includes a first central orifice adapted to the first plane; the first shaft is received in the first central orifice such that the first friction piece and the first shaft move together.

10. The oscillating device used in combination with a swing apparatus as claimed in the claim **9**, wherein the driving assembly includes an actuator which is secured to the base, a driver which is connected to the actuator, a follower which is connected to the driver, and two links which are pivotally connected with each other and respectively connected to the follower and the first shaft; one of the two links includes a second central orifice adapted to the first plane; the first shaft is received in the second central orifice such that the one of the two links and the first shaft move together.

11. A swing apparatus for children comprising a first frame, a second frame, and an oscillating device connecting the first frame with the second frame, the oscillating device includes:

a base connected to the first frame;

a driving assembly mounted to the base;

an output piece pivotally connected to the base via a first shaft; and

a transmitting assembly further including a first friction piece which is driven to oscillate back and forth by the driving assembly, the first friction piece being coupled to the base by the first shaft;

wherein a magnitude of a friction force between the first friction piece and the output piece determines whether the first friction piece moves relative to or together with the output piece, and the driving assembly causes the second frame to swing relative to the first frame.

12. The swing apparatus for children as claimed in the claim **11**, wherein the transmitting assembly further includes a second friction piece which is for cooperating the second frame and an elastic piece which urges against one of the first friction piece and the second friction piece; the first friction piece moves relative to or together with the second friction piece depending on a magnitude of a friction force therebetween.

13. The swing apparatus for children as claimed in the claim **11**, wherein the swing apparatus further comprises a shielding device which is pivotally mounted to the oscillating device.

14. The swing apparatus for children as claimed in the claim **11**, wherein the first shaft passes through the transmitting assembly and has a first plane; the first friction piece further includes a first central orifice adapted to the first plane; the first shaft is received in the first central orifice such that the first friction piece and the first shaft move together.

15. The swing apparatus for children as claimed in the claim **11**, wherein the oscillating device includes a second shaft and another base; the second shaft has a bent first section and the another base has two blockers; the bent first section moves between the two blockers so that the moving range of the second shaft and the output piece is restricted.

16. The swing apparatus for children as claimed in the claim **11**, wherein the driving assembly includes a sensor which is secured to the base, an actuator which is secured to the base for supplying power to the transmitting assembly, a driver which is connected to the actuator, a follower which is connected to the driver, and a link device which are pivotally connected to the follower and a first shaft which passes through the transmitting assembly, the sensor is configured to sense the movement of the link device so as to control the output of the actuator.

17. A swing apparatus for children comprising:

a first frame;

a second frame; and

an oscillating device connecting the first frame with the second frame, the oscillating device includes a base connected to the first frame, a driving assembly mounted to the base, an output piece secured to the second frame pivotally connected to the base, a transmitting assembly mounted between the driving assembly and the output piece, and a first shaft connected to the driving assembly and passing through the transmitting assembly;

wherein the transmitting assembly includes a first friction piece secured to the first shaft, and a second friction piece un-rotatably connected to output piece; when the first shaft is driven to rotate relative to the base by the driving assembly, the first friction piece is moved together with the first shaft, and the second friction piece is driven to rotate relative to the base by the friction between the first friction piece and the second friction piece so that the second frame is driven to oscillate back and forth relative to the first frame.

18. A swing apparatus for children as claimed in claim **17**, wherein the first friction piece includes a first rough face and the second friction piece includes a second rough face; the transmitting assembly further includes a packing with two opposite side faces which respectively contact the first rough face and the second rough face.

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